



ADAPTATION FUND

ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regional Project

Countries/Region: Chad, Cameroon, Central African Republic, Niger, Nigeria
Project Title: Integrated water resources management and early warning system for climate change resilience in the Lake Chad Basin
Thematic Focal Area: Disaster risk reduction and early warning systems
Implementing Entity: World Meteorological Organization (WMO)
Executing Entities: Lake Chad Basin Commission (LCBC), Global Water Partnership Central Africa (GWP-CAf)
AF Project ID: AF00000224
IE Project ID: **Requested Financing from Adaptation Fund (US Dollars):** 10,755,000
Reviewer and contact person: Mahamat Assouyouiti **Co-reviewer(s):**
IE Contact Person: Scientific Officer Johanna Korhonen, Earth System Monitoring Division
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<p>Technical Summary</p>	<p>The project “Integrated water resources management and early warning system for climate change resilience in the Lake Chad Basin” aims to increase the resilience of the population in the Lake Chad Basin by enhancing the countries capability to manage and adapt to climate-related risks through improvement of hydrological monitoring, data systems and service delivery and awareness on climate-related hazards. This will be done through the six components below:</p> <p><u>Component 1:</u> Improvement of hydrological and meteorological observing system networks USD1,812,500 <u>Component 2:</u> Strengthening regional hydrometeorological information systems (database and data sharing mechanism) USD882,500 <u>Component 3:</u> Identification and development of hydrometeorological products and services USD2,542,500 <u>Component 4:</u> Training of project stakeholders and knowledge development USD805,000 <u>Component 5:</u> Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services (communication and timely diffusion of appropriate product and services to end users) USD1,526,500 <u>Component 6:</u> Plans and communities' response capacity USD1,485,000</p> <p><u>Requested financing overview:</u></p>
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	<p>Project/Programme Execution Cost: USD 855,000 Total Project/Programme Cost: USD 9,855,000 Implementing Fee: USD 900,000 Financing Requested: USD 10,755,000</p> <p>The initial technical review raised several issues such as the need for more information on cost-effectiveness, consultation undertaken during the project preparation to consider the needs of the most vulnerable, duplication and synergies with other projects, and the potential use of USP as is discussed in the number of Clarification Requests (CRs) and Corrective Action Request (CAR) raised in the review.</p>
Date	14 September, 2023

Review Criteria	Questions	Comments	WMO Responses
Country Eligibility	1. Are all of the participating countries party to the Kyoto Protocol, or the Paris Agreement?	Yes.	
	2. Are all of the participating countries developing countries particularly vulnerable to the adverse effects of climate change?	<p>Yes.</p> <p>Overall, the funding proposal clearly outlines the climate vulnerability faced by the Lake Chad region and in the participating countries including the increasing vulnerability of water resources (surface and groundwater) and lack of monitoring data. The Lake Chad Basin, which faces a high demographic growth</p>	

		<p>with a population estimated at 50 million by 2023 and with high hydroclimatic variability, is one of the most threatened ecosystems in Africa, combining hydroclimatic variability, ecological ecosystem richness and vulnerability, socio-economic (production of food resources and employment) and political (governance, security) issues.</p> <p>Over the last few years, the impact of climate variability has caused several disasters including extreme events that have affected over 30 million people (0.63 million/year), nearly 4,000 deaths (75 deaths/year). Droughts affected the largest number of people (90% of the total). The impacts of these extreme events are becoming more devastating due to an increase in both their</p>	
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		frequency and intensity, as well as the growing vulnerability and exposure of the region.	
Project Eligibility	1. Have the designated government authorities for the Adaptation Fund from each of the participating countries endorsed the project/programme?	Yes. As per the Endorsement letter dated 22 June 2023 by the 6 countries.	
	2. Does the length of the proposal amount to no more than One hundred (100) pages for the fully-developed project document, and one hundred (100) pages for its annexes?	Yes.	
	3. Does the regional project / programme support concrete adaptation actions to assist the participating countries in addressing the adverse effects of climate change and build in climate resilience, and do so providing added value through the regional approach, compared to implementing similar activities in each country individually?	Not fully addressed. Overall, the full proposal document describes well the adaptation rationale as well as the regional approach with a set of activities related to water resources management and early warning system for climate change resilience. The proposal also outlines the expected outcomes from the improvement	CR1: Both the Implementing Entity (WMO) and the Executing Entities (LCBC and GWP-CAf) have considered the suggestion to streamlining the project structuring and reducing the number of components, as well as ensuring coherence between activities of similar nature. The Components of the proposed project follow the hydrometeorological value chain with specific aspects in each of the elements, as presented in the diagram below. The first three components relate to the three major elements of the hydrometeorological value chain, namely observation networks (Component 1), information systems (Component 2) and modeling and forecasting (Component 3). While there will be trainings associated with each of these components, institutional strengthening and capacity building, especially in relation to operations and sustainability, are cross-cutting themes and therefore, Component 4 is specific to these aspects. Regarding the

of hydrological weather stations that lead to better monitoring of water resources in the 6 countries with support by the regional organization (LCBC).

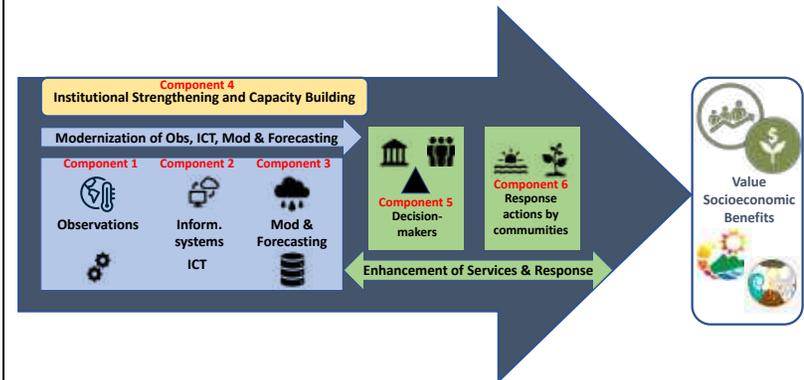
By covering the "new conventional basin" as project intervention area of about 1 million km² (Figure 4) and subject to extreme hydrometeorological events, the regional approach is well described.

The proposed theory of change (figure 5) provides a coherent results framework with current/future situation and expected outcomes.

However, there are few clarifications to be made to better structure the overall project structure at this stage of full project development.

services and users, there are two levels that need to be addressed differently. These are:

- the decision-makers (Component 5) that require specific activities related to awareness raising to take critical decisions at real time during extreme hydromet events, as well as decisions required for sustainability of the investments;
- the user communities (Component 6) that require activities that relate to on-the-ground and actual response in the 5 participating countries.



While there might be a perception of similar nature of some activities (e.g. all stakeholders need training) and that some components and activities could be combined, the actual content of these activities varies significantly. In addition, this framework structure will enable adequate monitoring and reporting on the envisaged deliverables, thereby contributing to an effective and efficient Monitoring and Evaluation (M&E) of the project execution. Therefore, the Implementing Entity (WMO) and the Executing Entities (LCBC and GWP-CAf) agreed that the current structure is appropriate.

CAR1: Given the importance of the economic, social and environmental role of the Lake Chad Basin, and given the complexity and the large and ever-increasing number of

		<p>The project includes too many components (#7) which could be further streamlined. For example, the identification, development, and improvement of hydrological and meteorological networks both at national and regional level could be structured under a single component instead of 3 separate components as currently proposed. The same applies to activities related to awareness raising and stakeholders training could be merged under a single component.</p> <p>CR1: Please consider streamlining the project structuring and reduce the number of components. Also, please ensure coherence between activities of similar nature currently divided between multiple components.</p>	<p>problems to be solved within the Basin, numerous projects with similar or related objectives to those of this proposed project have been developed by development partners, in collaboration with the LCBC and/or the countries sharing the Basin. Although these past and recent initiatives recognize the value and importance of hydrometeorological monitoring for socio-economic development and the preservation of the Basin's resources, none of them has focused on setting up an adequate system to efficiently ensure long-term knowledge for the control and rational management of water resources throughout the Basin.</p> <p>As it can be seen in Table 14 of the project proposal, most of the initiatives have been able to identify issues and gaps either in sectoral monitoring (groundwater, for example, for projects financed by BGR and BMZ), or pilot sites, or only certain countries in the Basin. In fact, the list in Table 14 includes a total of 25 projects, seven of which were developed and/or implemented in collaboration with the LCBC. Only three of the seven projects concern the whole Basin, while the other four concern only specific LCBC Member States. The other projects are national or regional initiatives or concern other basins than the Lake Chad. As a result, the hydroclimatic data available (in the countries and at the LCBC) on the Lake Chad Basin have too many gaps to be able to adequately contribute to economic and social development, preservation of the natural environment, prevention of risks linked to severe hydroclimatic events, as well as providing a precise idea of their evolution over time.</p> <p>Taking all this into account, and building on lessons learned from past initiatives, the present project proposal aims to fill this gap and respond to national and Basin-wide needs in a holistic approach. It also takes into account the information and recommendations of the recent LCBC Strategic Action Programme and the Lake Chad Basin Master Plan, as well as the requirements of the Lake Chad Basin Water Charter.</p>
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	<p>4. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy of the Fund?</p>	<p>Not fully addressed.</p> <p>The project describes clearly the economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, as contained in Table 11. In addition, the annex 1 include additional details on the socio-economic</p>	<p>CAR2: The cost benefit of preventing disasters versus management and recovery, as well as sustaining project investments is well established and appreciated by the AF. The consultations under Component 3 to identify the type of services related to climate impact and based on sector vulnerability and the willingness-to-pay for a product or service would be guided by the framework/methodology for community engagement and consultations planned under Outputs 3.1, 5.2, 6.2 and 6.2 of the project proposal.</p> <p>It is worth to note that GWP-CAf, LCBC, and WMO benefit from a good knowledge of the Basin's stakeholders due to their long collaboration with them, which is a particularly important asset to the organization of such consultations. The consultation processes in the development of the project were participatory and included all stakeholders, including</p>

		<p>benefits of the proposed EWS initiatives.</p> <p>The full proposal includes a gender assessment and action plan as well as a full ESMP in accordance with the AF the Environmental and Social Policy.</p> <p>However, there are number of areas that need further clarification and improvements.</p> <p>Under component 3 “Identification and development of hydrometeorological products and services”, it is proposed to hold number of consultations to identify the type of services related to climate impact and based on sector vulnerability including agriculture. It is also proposed under activity 3.3.4 to “Conduct a willingness-to-pay (WTP) survey</p>	<p>the most vulnerable. The next consultations during project implementation will also draw on this added value of the partners. To ensure no group or persons are left behind, the methodology of Focus Group Discussions (FGDs) would be adopted for consultations in selected project communities which will include sector, gender, and vulnerability considerations. Following these FGDs, structured WTP survey questionnaires will be administered accordingly to elicit responses relating to service preferences, value attachable to products and services, utilization capacity, and future expectations.</p> <p>The FGDs will involve detailed explanation on various climate and early warning products and services including its components (features and value) depending on the audience group based on sector, livelihood type, gender, and vulnerability rating. This method will enhance the output of the consultation especially regarding the influence of value and service features on willingness to pay and decision-making concerning uptake. This way, stakeholders can have a deeper understanding on the preference and importance placed on products and services based on its features and value.</p> <p>These consultations aim to enhance advisory evidence and information for decision making by policy makers and National Meteorological and Hydrological Services (NMHSs) in the project countries for sustainability purposes. The output would guide policy makers and particularly the National Meteorological and Hydrological Services towards prioritization of early warning investments for various sectors and vulnerable groups including the estimated cost requirements of delivering products and services to sectors, vulnerable groups, and community dwellers.</p> <p>The consultation output will provide secondary information which project countries can utilize in facilitating national programmes and in engaging with of other projects or donors</p>
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		<p>among stakeholders to gather feedback on most preferred climate-related products and services which could be paid for by policy makers and community dwellers as part of sustainability considerations for disaster risk reduction (DRR) and food security”. Considering the economic condition of communities and stakeholders in the region, such paid service needs to be carefully assessed and implemented in a way that no one is left behind and the principle of equity and ensure the equitable distribution of benefits to vulnerable communities, households, and individuals.</p> <p>CAR2: Kindly clarify how the consultations will be undertaken in a way that the most vulnerable are included</p>	<p>to cover sustainability gaps related to the provision of climate and early warning products and services.</p> <p>CAR3: As is the case in many fields of activity, it is well known that proof of the usefulness of hydrometeorological data (and more precisely of the information derived from the data) is likely to lead to funding for their collection from water users. These include the main users of water information, such as dam (hydroelectric and hydroagricultural) and waterway managers, water supply utilities, etc., but also government authorities who need water information for water-related disaster prevention, for example. Any relations with the private sector would be framed in accordance with WMO public-private partnership practices, while taking account of national regulations. The willingness-to-pay survey is therefore not aimed at the basin’s vulnerable communities, and no fees are envisaged at any stage of the development and implementation of the activities. On the other hand, special attention will be paid to the contribution of local communities in the spirit of citizen science, with their own data and tools. Indeed, it is essential for the project to combine all data sources (taking of course, into account the potentially very different quality in terms of accuracy, responsibility and frequency of measurement), including satellite observations, in order to guarantee the efficiency and sustainability of the network. It should be noted that the possible participation of the private sector and the combination of the above-mentioned data sources are complementary and do not constitute an alternative to the financing of hydrometeorological monitoring activities, which is the sovereign duty of Member States. In order to draw attention to this issue and encourage States to resume hydromet funding, sustainability is at the core of the new WMO strategy for the development of hydrometeorological monitoring networks used in the development of the present project. This strategy is based on a combination of the</p>
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		<p>and their needs taken onto account.</p> <p>CAR3: Considering the economic situation of vulnerable communities in the region and needs for equitable distribution of adaptation benefit, please clarify how the proposed climate services will be implemented after the willingness-to-pay (WTP) survey? Is there any other delivery model considered as alternatives options ?</p> <p>CR2: Please update the data used incl. socio-economic data which are outdated (2017 the latest for GDP or 2019-2020 for population).</p> <p>CR3: Please confirm whether the current usage of groundwater in Nigeria and Cameroon (permanent use of Pliocene aquifer) undermine the climate</p>	<p>following elements: i) a bottom-up approach for user requirement creating ownership, ii) a minimization of operation and maintenance costs thanks modern and robust devices, iii) establishment of products and services showing the benefits of the information system, iv) a flexible network answering new needs and v) involvement of local institutions and communities in maintenance, caretaking and data collection.</p> <p>CR2: GDP and GDP per capita have been updated with the 2022 data in the project proposal based on the WB data for GDP and WB data for GPD per capita (see Tables 5 and A1.2.1.). The World Hunger Index has also been updated to 2022 data in Table 5. While there is more up-to-date data for population in the five countries, no recent reference has been found for the actual number of inhabitants in the Lake Chad Basin, which does not represent the full countries.</p> <p>CR3: The increasing pressure on water resources from population growth and industrial, agricultural and ecological needs must be taken into account when managing the resource, including groundwater, particularly in regions where it is the main source of drinking water, as it is the case in certain areas of the Lake Chad basin, such as northern Nigeria and Cameroon. This is important given that the classic functioning of aquifer systems is being disrupted by the effects of climate change, which are affecting the availability and sustainability of the resource. Basically, climate change and variability affect groundwater recharge rates, water table depths and water reserves in aquifers. The general decline in rainfall caused by climate change is causing increased exploitation of groundwater leading to serious decline in water levels and boreholes yields in the Lake Chad Basin as surface water resources are almost unavailable (Yusuf, 2015). However, this does not</p>
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		change rationale of the water management issue in the lake as described in this project (ref. page 9). Please provide reference to any assessment done during the project development.	undermine the climate change rationale of the water resource management in the Basin. On the contrary, studies have shown the decline of the Pliocene aquifer due to the lack of adequate recharge caused by the decrease in rainfall (TDA, 2018).
	5. Is the project / programme cost-effective and does the regional approach support cost-effectiveness?	<p>Partly addressed.</p> <p>Overall, the full proposal document describes the cost-effectiveness to be achieved through the regional approach. In addition, the Annex 1 “socio-economic benefits of improved hydrometeorological services and early warning systems in the lake Chad basin” provides a cost-benefit analysis associated with the proposed interventions.</p> <p>CAR4: Please share with us the excel file referenced in page 35 that includes the cost-benefit analysis and results.</p>	CAR4: the web link to the excel file has been added.

	<p>6. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments? If applicable, it is also possible to refer to regional plans and strategies where they exist.</p>	<p>Partly addressed. The full proposal describes clearly the alignment with existing national and regional development strategies as well as climate related documents for all five participating countries. Ref. Section E, page 35</p> <p>However, there is little information about the project alignment and ability to support LCBC in the implementation of its Water Charter and more specifically on the groundwater management.</p> <p>CR4: Please explain how this project aims to support the LCBC water charter in the area of groundwater management and regional collaboration?</p>	<p>CR4: The Lake Chad Basin Water Charter defines, among other things, rules for sharing water between Member States, sub-basins, uses and users, in order to reconcile economic development and environmental preservation. It also includes rules for managing wetlands and groundwater, as well as support for civil society participation and organization around environmental issues. To meet these challenges properly, it is essential to have reliable data and information, in particular hydroclimatic data of high quality, which requires a great investment in data collection and analysis. Close and rigorous hydrological monitoring is therefore essential to better understand the mechanisms at play. Therefore, the present project will help meet these challenges. Among other things, it will contribute to the revival of NMHSS' activities, the modernization of the data collection and analysis system, the strengthening of technical and institutional capacities through training sessions, and the development of decision-making tools that are essential for better implementation of the dispositions of the Water Charter.</p> <p>As for the groundwater in the Lake Chad Basin, little is currently known about its availability, quality and use. However, they are the main source of water supply for most of the Basin's population, and pressure on the resource is steadily increasing, particularly in northern Cameroon and Chad. Better monitoring is therefore essential to improve understanding of the hydrogeology of the entire basin, aquifer recharge, interactions between surface and groundwater, etc. Given the extent of the financial resources required, most of the project's activities in this area will be based on those from ongoing projects. The expected results will, however, provide a sufficiently solid basis as an initial step for further detailed analysis of the groundwater resources in the basin, and will enable the updating of the water resource allocation and planning model in the Lake Chad Basin.</p>
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			<p>As for regional collaboration is concerned, it should be noted that the project aims to provide hydromet information to decision-makers, enabling them to design efficient infrastructures and adequately manage water resources, including in flood and drought situations, throughout the Lake Chad Basin. This objective can only be achieved if there is close collaboration between countries, and in particular the sharing of data between the technical departments concerned and the LCBC. While countries are the owners of the data collected under the project, data sharing is a fundamental principle of WMO membership, and unrestricted data sharing is envisaged, to enable the LCBC to feed the Regional Database, develop decision-support tools, and develop and share regional information products. Therefore, in the absence of the entry into force of the Water Charter, one of whose requirements is that Member States organize hydrological monitoring in their national portion of the Basin and exchange data with other countries and the LCBC, it is planned that participating countries will sign a specific agreement for data sharing, in accordance with the provisions of the Lake Chad Water Charter. It should also be noted that, on a regional and national scale, the project plans to implement the WMO HydroSOS system, with a view to providing aggregated data on the current hydrological situation and the outlook for the coming weeks and months, based on global and regional hydrological models. The aim is to inform stakeholders in the basin about the evolution of the hydrological situation in order to detect anomalies likely to lead to water-related disasters, and thus improve risk prevention, for example.</p> <p>Preliminary surveys carried out in preparation for the project have nevertheless shown that the free sharing of data remains one of the main challenges to be overcome. It should be noted, however, that the development of project activities includes numerous activities such as training, which will promote networking between NMHS staff from</p>
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			participating countries and the LCBC. Experience has shown that this type of meetings helps to create/consolidate links between staff. Such links help not only to promote the exchange of experience between staff, but also the sharing of data. The development of the project's activities will also be an opportunity for the LCBC to demonstrate its ability to fulfil its mandate by providing a suitable response to the real needs of the populations and requirements of the Member States, which will help to demonstrate the importance of data sharing and encourage its maintenance even at the end of the project.
	7. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?	Yes The funding proposal describes the project alignment with the relevant national technical standards, where applicable for all six participating countries (table 12).	
	8. Is there duplication of project / programme with other funding sources?	Partly addressed. The full proposal describes how complementarity is built with existing projects in the region including from those funded by GIZ, BMZ, WB, GEF, CREWS, AfDB, PULCI and AF as described in table 14. However, as indicated in table 14, there are more than 28 initiatives that are ongoing or completed and that overlaps or	CR5: During the preparation of the project, the LCBC's Executive Secretariat, its Technical Committee of experts from Member States, the GWP, as well as the NMHSs (WMO Members) and designated Adaptation Fund authorities of the beneficiary countries were consulted, to provide, among other things, exhaustive information on initiatives currently underway or planned in the countries and the region, as well as those recently completed, whose objectives are complementary or similar to those of the proposed project. The World Bank and other regular and potential LCBC partners were also consulted to gather information on the subject. Table 14 in the project document lists the various projects identified, together with possible synergies and complementarities. All possible and necessary efforts have been made to ensure that this complementarity is effective in project activities. In particular, the setting up of

		<p>complement the proposed project. It is difficult to clearly see how the project will build on previous achievements by other initiatives. Many of these initiatives and projects includes activities related to capacity building, awareness raising, development of hydrometeorological products and services and climate information. In addition, the proposal is unclear to how it has incorporated lessons during its development, as it states for example for the CREWS initiatives that “The results achieved in Chad and Niger will be utilized in the development of this proposal”.</p> <p>CR5: Can you please confirm that despite the long list of initiatives currently ongoing in the region or completed, there is no duplication</p>	<p>the project's monitoring network will take into account existing stations and equipment already in place or planned for installation as part of other projects, and therefore, there will be no duplication, but complementarity between this and other projects.</p> <p>In addition, the proposed project structure allows for the identification of stakeholders beyond those identified in the project proposal development, and for adaptive management related to any changes that may have occurred between proposed project proposal development and project implementation. A full stakeholders’ mapping will be carried out and incorporated into the baseline assessment that will be prepared as part of the M&E framework. This will ensure that that any projects, programmes or other initiatives, or stakeholders that may be critical to project success, are captured and incorporated into the plan for project implementation. The stakeholders’ mapping will be reviewed throughout the project implementation, in particular during the Mid-term Review, also part of the M&E framework. Close collaboration with the external partners of the above-mentioned and other projects during the inception phase and implementation of the present project (is essential to consolidate and refine these collaborations, validate roles, but also to develop new synergies or other new areas of complementarity.</p> <p>CAR5: The project development has included lessons learnt from the ongoing initiatives, including CREWS. In particular, the CREWS-Chad has introduced innovative approaches that will be scaled up to the Lake Chad Basin, including:</p> <ul style="list-style-type: none"> - the RAINCELL technique which consists of inferring the quantities of rain that falls by analysing the disturbances of radio waves from mobile phones;

		<p>and that all efforts have been made to enhance complementarity?</p> <p>CAR5: Please clarify whether the project development has included lessons learnt from the ongoing initiatives including CREWS and provide couple of examples of such learning?</p> <p>CR6-1: Given the strong linkages between this project and SOFF initiatives, please describe if there is any expected support from SOFF that will complement the proposes investments including rehabilitation of stations to be GBON compliant. Since Chad has already been approved in first batch of SOFF, please indicate if SOFF support to Chad is complementary to the proposed investment under this project in Chad.</p>	<ul style="list-style-type: none"> - the use of Satellite Altimetry to measure water levels from satellites. <p>Other examples include the specifications of Hydrological Stations acquired under other projects that have not been installed due the need to re-engineer them to work with solar power instead of electricity as currently setup. The proposed project could address this issue in these stations and develop the appropriate technical specifications for new stations that may need to be acquired under the proposed project.</p> <p>The above-mentioned stakeholders' engagement and mapping (as described in the response to CR5) will also facilitate the process of learning from past, ongoing and planned activities, and consider them in the project development and implementation.</p> <p>CR6-1: At this stage, Chad was approved as part of SOFF supported countries in 2022, and Niger in 2023. SOFF focuses only on stations registered as GBON (WMO Global Basic Observing Network), i.e., exclusively meteorological observing stations as per WMO Congress decision (surface and upper-air radio-sounding) and, as of today, the extension of SOFF to hydrological stations is under exploration (and potential implementation starting would be likely beyond this project timeline); however, meteorological stations (especially precipitation) will contribute to early warning systems in the Lake Chad Basin. Investments under this proposed project for these countries will focus on the acquisition, installation, and provision of related services associated with hydrological stations, to be complementary to SOFF support. In addition, both Chad and Niger have been selected as part of the 30 initial countries for the Early Warning for All (EW4All) coordinated assistance.</p>

	<p>9. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?</p>	<p>Partly addressed. Overall, the project learning and knowledge management activities are well described including under component 4 and 6 and a creation of a user community linked to the LCBC Knowledge Management Platform (PROLAC).</p> <p>However, and as requested at CN stage the project still lacks clarity on how KM and learning will be implemented at local level (country) and with clear timeline.</p> <p>CR6-2: At this stage of fully developed proposal more details on how the project will generate, manage, capture and disseminate project lessons including at local level with timeline, deliverables and budget if possible is needed.</p>	<p>CR6-2: Capacities for Knowledge Management exists within the Implementing Entity (WMO) and the Executing Entities (LCBC and GWP-CAf). Optimizing Knowledge Management is a strategic objective of their Capacity Development Strategies, which is implemented through their supportive organizational structures that use information and communication technologies (ICTs), with emphasis on teamwork and dissemination of knowledge that can assist in capacity development. Their Knowledge Management activities foster sharing of the experiences and resources, in partnership with other bodies and entities. The use of ICTs enables effective collaborative approaches, real-time information sharing, monitoring and feedback. Encouraging communities of practice complements ICTs, as human interaction is essential for knowledge management, in particular to provide assistance and insight, experience and knowledge. The sharing of needed skills and information also includes the use of volunteers and third-party contributions, including NGOs. Taking into consideration these existing capacities, a Knowledge Management plan will be developed during the inception phase of the proposed project.</p> <p>In particular, Outcome 5.2 will support specific knowledge management efforts to be implemented at local level. With the development of learning and communication materials, as well as the meetings and trainings that will be used to roll out EWS, information sent to communities will be improved as it goes along, and lessons learned targeting local level will be shared/disseminated through these planned materials and meetings (including radio announcements, brochures, etc.). In addition, school learning and communication materials (including in local languages) will be developed, and an EWS section will be added to the LCBC Community Connect platform.</p> <p>Learning sessions will be carried out periodically with stakeholders involved including local ones, to draw lessons</p>
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			<p>for the project implementation partners, beneficiaries or other external parties to the project. This will be done by, <i>inter alia</i>, working with local grass root leaders through forming committees.</p> <p>Every quarter, the Project Management Unit (PMU) in collaboration with the knowledge management and communication experts' team, will be responsible to highlight good practices and/or lessons learned to be discussed during annuals Project Steering Committee meetings. The dissemination will be done internally in project reports, websites of GWP-CAf, LCBC and WMO, and through different communication channels adapted to the target beneficiaries.</p> <p>These activities start in year 2 of the project and will be implemented up to the end of the project, and overall budget is 362 500 USD (i.e. the full budget of Activity 5.3.2 budget and the budget for the consultation meetings and training under Activities 5.4.1, 5.4.2 and 5.4.3).</p>
	10. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations?	<p>Yes</p> <p>The document confirms that consultations were undertaken by WMO in all 6 countries and with all stakeholders involves. Ref. Annex 2, 3 and 5 for further details</p>	
	11. Is the requested financing justified on the basis of full cost of adaptation reasoning?	<p>Partly addressed.</p> <p>Overall, the requested financing is justified based on the full cost of adaptation as outlined in section J. In addition,</p>	<p>CAR7: CAR1 and CR5 provide justifications on the complementarity of the proposed project with other initiatives and on building its activities on their lessons learned and results. These various projects and initiatives bring different approaches and technologies, which require a significant level of effort and specialized expertise by LCBC and its Member States to operate and maintain. Often systems do</p>

		<p>the table 15 provides a rationale for AF funding (with/without scenario). The adaptation funding rationale is strong, as indicated with the integration of the EWS at regional level which aims to build a regional capacity for resilience in multiple productive sectors.</p> <p>There are multiple references to co-financing in the project document including under “sustainability section”.</p> <p>Despite additional work conducted during full proposal development, there are still few issues to be clarified including:</p> <p>CAR7: In addition to CAR1 and CR5, please provide further justification on the added value of the proposed AF funding to LCBC institutional support and how the proposed additional</p>	<p>not operate after project completion due to limited capacity to operate and maintain them, even if financial support is available for spare parts. The proposed AF funding under this project to LCBC institutional support will enable the establishment of interoperability of systems and harmonization of approaches for operation and maintenance, and the availability of a pool of experts that could assist any of the NMHSs in the Lake Chad Basin. In addition, through the Innovation Calls supported by the proposed AF funding, it is expected that parts of the equipment be manufactured, and the interoperable/integrated system be developed within the region at lower costs. These aspects contribute to a reduction of operation and maintenance costs as expertise exist within the region and there will be no need to bring experts and equipment from abroad.</p> <p>At this stage, co-financing of the proposed project consists only of in-kind contributions from the five participating countries with the staff time of the government institutions, in addition to the budget line that has been created in the budget of the LCBC Basin Observatory Division, to support countries in the development of hydrometric activities on a minimum number of stations. These aspects are aligned with the letters of support.</p> <p>CR7: With the proposed AF funding, it will be possible to start implementing <u>HydroSOS</u> in the Lake Chad Basin (Outcome 3.2). HydroSOS products to be developed will support flood forecasting and drought prediction in the Lake Chad Basin, which will improve planning and allow adaptation actions in various sectors, including in agriculture. Through Outcome 6.1, these new products will be used to support integrated flood and drought management strategies and plans, which will include specific adaptation measures to</p>

		<p>support is justified. Kindly confirm if the project expect any co-financing.</p> <p>CR7: The concrete adaptation actions benefitting the communities are still unclear in particular the provision of climate information services, in particular related to productive sector (i.e agriculture). Please explain how AF funding will generate concrete adaptation benefits to communities including provision of climate information services, for which a willingness-to-pay survey is proposed. If a paid service is envisaged, please provide a rationale in line of the AF principles of equity and focus on most vulnerable people.</p> <p>CAR8: Under component 6 "Plans and communities' response capacity", the</p>	<p>be taken by the communities, including on how to rationalize water, crop selection, and calendars, and taking into account gender aspects.</p> <p>As indicated in the response to CAR3 above, the willingness-to-pay survey is not aimed at the basin's vulnerable communities, and no fees are envisaged at any stage of the development and implementation of the activities.</p> <p>CAR8: In Component 5, the proposed project intends to develop emergency plans only in target locations. While the plans to strengthen governance and climate resilience developed in Component 6 will allow the national (Output 6.1) and local (Output 6.2) levels to have favorable conditions to adapt to flooding and drought. These are perfectly aligned with Output Indicator 7.1 of the Adaptation Fund.</p> <p>CR8: As indicated in the response to CAR7 above, at this stage, co-financing of the proposed project consists only of in-kind contributions from the five participating countries with the staff time of the government institutions and the budget line that has been created in the budget of the LCBC Basin Observatory Division, to support countries in the development of hydrometric activities on a minimum number of stations. These aspects are aligned with information in the LCBC annual work plan and the letters of support. No further co-financing is expected.</p>

		<p>proposed activities do not clearly justify the full of adaptation reasoning as it focusses mostly on governance related issues and mechanisms at basin level. The proposed contingency plans under component 5 seems more aligned with the component 6 if detailed enough to ensure concrete actions. Kindly clarify.</p> <p>CR8: The project document states that “The project design also foresees a contribution from the countries to the financing of the hydromet monitoring activities and development of products. This contribution, minimal in the first year, will gradually increase until the last year of the development of the activities when it should reach, for each country, the equivalent of the</p>	
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		<p>annual cost of operation and maintenance of the stations of the hydrometric network located in the respective national portions of the Basin”. Kindly confirm is such support is mobilized as a co-financing and if yes please ensure that the full cost of adaptation reasoning is adequate. Note that any co-financing mobilized for this project needs to be secured and committed before the project is approved by the Board.</p>	
	<p>12. Is the project / program aligned with AF’s results framework?</p>	<p>Partly addressed.</p> <p>Overall, the project document specifies the alignment with Adaptation Fund revised strategic results framework including Outcomes 1, 2, 3, 4, 7 and 8, ref. table 25. However, the results framework included under Table 23 and 25 do not specify which AF</p>	<p>CR9: The following AF core indicators have been included in Tables 23, 24 and 25 related to the results framework of the proposed project:</p> <ul style="list-style-type: none"> - 8.1. No. of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated - 1.1.2. No. of early warning systems (by scale) and no. of beneficiaries covered - 7.1. No. of policies introduced or adjusted to address climate change risks (by sector)

		<p>core indicators the project will report on.</p> <p>CR9: Please include at least 2 AF core indicators in the project results framework including number of beneficiaries and EWS.</p>	
	<p>13. Has the sustainability of the project/programme outcomes been taken into account when designing the project?</p>	<p>Not addressed</p> <p>The project sustainability is described at length and seems adequate for most of the activities except the concrete adaptation actions including the EWS stations and other hydrometeorological stations (rehabilitated or new ones). In addition, the document states that “a budget line has been created in the budget of the LCBC Basin Observatory Division, to support countries in the development of hydrometric activities on a minimum number of stations. In order to ensure its sustainability, the stations of the EWS</p>	<p>CAR9: The proposed funding mobilized by countries in support of the hydromet monitoring activities and development of products will help the project sustainability, including through Output 1.2 activities as well as activity 5.1.1, in particular the Ministerial Roundtables that will contribute to secure future funding to support the project and associated O&M.</p> <p>The sustainability is a matter for joint action by the public and private sectors, and can be best achieved by assuming complementary roles, which minimize overlap and unnecessary competition, and where the strengthens of each sector are reinforced. The Geneva Declaration, adopted by the WMO Congress in 2019, supports the Public-Private-Engagement (PPE) (please see https://public.wmo.int/en/our-mandate/how-we-do-it/public-private-engagement-ppe).</p> <p>One of the possible types of engagement with the private sector include exploring potential business relations with the private sector. This proposed project provides the appropriate environment to test the implementation of such PPE. Examples include the inclusion in the bidding documents for e.g. observation networks, the specifications for a public-private-partnership (PPP) where the firm will be responsible (as usual) for the supply, installation, testing and commissioning; and for assisting the NMHS in</p>

		<p>network that are not yet in this minimum number will be included”.</p> <p>CAR9: Please refer to CR8 and confirm that the proposed funding mobilized by countries in support of the hydromet monitoring activities and development of products, is effective and will not undermine the project sustainability.</p> <p>CR10: As requested as CN stage, please elaborate on how EWS investments at national and regional will be maintained including O&M scheme and a sustainability plan after project closure. The information provided under section K is not adequate at this stage of full proposal development. Please include a comprehensive O&M framework including</p>	<p>commercializing the data for specific sectors against getting access to the data and sharing the revenues with the NMHS (as indicated in the response to CAR3, these sectors include dam (hydroelectric and hydroagricultural) and waterway managers, water supply utilities, etc.). The private sector has experience with commercial services; which is not the case of the NMHSs; and will have an incentive to provide the data as a service. Therefore, the NMHSs of the five participating countries would significantly benefit from such approach. This is an innovative approach that is being demonstrated through the implementation of World Bank Hydromet Modernization projects in Myanmar and in Nepal.</p> <p>Other possible mechanism for the engagement with the private sector is through the licensing with an associated fee that the NMHS would receive in case a private company would like to provide hydromet services in the five participating countries supported by this proposed project. This would require strengthening the legal and regulatory in the five countries and the region.</p> <p>CR10: In addition to the responses to CAR3, CR8 and CAR9, a comprehensive O&M framework including budget, sources and timeline has been included in section K.</p> <p>The Excel file that describes the cost-benefit analysis and results, includes a calculation of the O&M costs from Year 2 onwards, which (based on international literature and other projects implemented in the region) is estimated to be 6% of the cumulative investments. It is noted that there is an increase from 114 901 USD in Year 2 to 637 200 in Year 6 (after project completion), covering O&M costs for the five countries and the regional structures. Sources of funding to cover the O&M costs have been identified above, including</p>
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		budget, sources and timeline.	the in-kind contributions by the countries, the dedicated budget line at LCBC level, the PPE approaches, and the innovative approaches to manufacture parts of the equipment in the region in order to reduce costs.
	14. Does the project / programme provide an overview of environmental and social impacts / risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	<p>Partly addressed.</p> <p>Overall, the project compliance with the Fund’s ESP and gender policy seems adequate. In addition, project has been screened against all 15 principles and a full Environment and Social Impact Assessment (ESIA) and gender assessment and actions plan are included in annex 3 and 4.</p> <p>However, it is unclear how the proposed mitigation measures to potential impacts and risks are coherent and effective (ref. table 16). This is particularly valid for principles “Marginalized and Vulnerable Groups” and “Involuntary Resettlement”.</p>	<p>CR11: The stakeholder involvement approach presented in the proposed project ensures that the needs of marginalized and vulnerable groups are taken into account, i.e. no activity will be implemented without fully considering them. These aspects are clearly stated in the Project Results Framework under Components 5 and 6. Table 16 has been revised accordingly.</p> <p>As indicated in the response to CAR3 above, the willingness-to-pay survey is not aimed at the basin's vulnerable communities, and no fees are envisaged at any stage of the development and implementation of the activities.</p> <p>CR12: No involuntary resettlement will result from proposed project activities. While not all sites for the proposed network of hydrometeorological stations have been identified at this stage, site selection will focus on the rehabilitation and modernization of existing, brownfield sites. On these sites, impacts to local communities will be limited to a short-term increase in traffic with limited and reversible adverse impacts. In the event that greenfield installations are required, environmental and social impacts will be limited to the short-term impacts of civic works. However, given the small footprint of proposed works and the pre-existing availability of public land available for project activities, these works will not result in involuntary resettlement. According to information collected on the ground from municipal authorities and National Meteorological Services, there are enough lands at their possession to meet the needs. Table 16 has been revised accordingly.</p>

		<p>In addition, the proposal is unclear or silent about unidentified sub-projects (USP) in particular in relation to proposed hydrometeorological stations.</p> <p>CR11: In relation to “Marginalized and Vulnerable Groups” and ref. CAR3, kindly confirm that no activity will be implemented without full consideration of marginalized and vulnerable groups including adaptation benefits that are proposed to be under paid services and propose any mitigation measures if yes.</p> <p>CR12: In relation to principle “Involuntary Resettlement” and as stated under section L that “Activities under Component 1 relating to the rehabilitation and installation of new stations are likely to generate negative</p>	<p>CAR9: Even if not all sites and location of new stations are identified at this stage, these locations will be where there is an existing damaged station or a manual station (brownfield sites) that will be replaced. The indication that the locations are not identified relate to the fact that a regional network will be designed, and not all existing (either damaged or manual stations) will be considered, as existing stations are part of national networks that might have other purposes than the monitoring system required for a regional/transboundary EWS. The use of brownfield sites will ensure that there will be no lasting environmental and social impacts beyond short-term impacts related to the installation of new monitoring equipment. These impacts are likely to be short-term in nature and predominantly related to minor nuisances related to increased access requirements. The selection of sites will be informed by the ESP of the AF, and any sites (brownfield or not) that are likely to result in currently unforeseen severe adverse social or environmental impacts will be removed from consideration. Therefore, no unidentified sub-projects (USP) will be in place under the proposed project.</p>

		<p>impacts in terms of land acquisition, restriction of land use, involuntary resettlement and production of waste related to the use of batteries and replacement of sensors”, kindly revise the Table 15 and Annex 3 to assess the risk associated with “involuntary resettlement”, identify impacts and propose a mitigation options.</p> <p>CAR9: Considering that not all sites and location of new stations are identified at this stage, kindly confirm if the project expects any USP. If not, please elaborate further on the location of all stations and concrete adaptation actions subject to USP policy.</p>	
	<p>15. Does the project promote new and innovative solutions to climate change adaptation, such as new approaches,</p>	<p>Yes</p> <p>The project is innovative as it introduced an integrated approach to water resource management and full</p>	

	technologies and mechanisms?	aligned with major EWS initiatives including EW4ALL.	
Resource Availability	1. Is the requested project / programme funding within the funding windows of the programme for regional projects/programmes?	<i>*AF Project Review Coordination team will let the reviewer know if there is anything to be noted in the review concerning the resource availability question.*</i>	
	2. Are the administrative costs (Implementing Entity Management Fee and Project/ Programme Execution Costs) at or below 10 per cent of the project/programme for implementing entity (IE) fees and at or below 10 per cent of the project/programme cost for the execution costs?	Partly addressed. Yes, but see below. CAR10: However, the IE fee has increased from the CN stage (from USD765,000 to USD837,675). Kindly explain the rationale for such increase.	CAR10: The IE fee has increased from the Concept Note (CN) stage to the full project proposal. This adjustment follows a WMO internal assessment of project support costs incurred by projects implemented by WMO. Upon re-evaluating indirect costs, we realized that we had not fully accounted for all the financing WMO needs for successful project implementation. Therefore, we are raising the IE Fee to the cap of 10% in this resubmission to ensure that indirect costs related to the project will be covered. Indirect costs for WMO include financial activities, such as accounting and grant agreement management for Executing Entities (implementing arrangements, financial statements, etc.), as well as administrative elements including human resources (consultant and staff contract management), procurement, legal, and travel support. In addition, the new Policy on Monitoring & Evaluation requires baseline, mid-term review and final reports, which were not envisioned in the original submission and therefore require additional budget for materializing them.
Eligibility of IE	1. Is the project/programme submitted through an eligible Multilateral or Regional	Yes	

	Implementing Entity that has been accredited by the Board?		
Implementation Arrangements	1. Is there adequate arrangement for project / programme management at the regional and national level, including coordination arrangements within countries and among them? Has the potential to partner with national institutions, and when possible, national implementing entities (NIEs), been considered, and included in the management arrangements?	<p>Yes</p> <p>The project document clearly describes the implementation arrangements and specific roles of each partners including IE, EE and project steering committee at national and regional levels. Ref. Part III, table 17.</p>	
	2. Are there measures for financial and project/programme risk management?	<p>Not yet</p> <p>The document highlights the measures for financial and project/programme risk management including assumptions for project delivery. However, it is not clear how the current status of the LCBC water charter</p>	<p>CR13: The Water Charter adopted by Member States in 2012 is one of the instruments developed by the LCBC to improve the effectiveness of consideration of the various issues and challenges related to the conservation and sustainable management of the Lake Chad Basin's water and related resources. As of today, four out of five States have ratified the Charter, which means that it has been accepted by all, in accordance with the LCBC regulations. Entry into force of the Charter has unfortunately been delayed by the deposit of instruments of ratification, which is still in progress. Three out of the four ratifying States have already deposited their instruments, and the deposit of those</p>

		<p>ratification will impact the project deliverables. The document states in multiple sections that not all countries have ratified the water charter expect in the section Part III.B that “It should be noted that the Water Charter of the LCBC, already ratified by the member countries”.</p> <p>CR13: Please confirm that all countries have ratified the water charter or include an assumption related to non-ratification as a potential risk and propose a mitigation measure.</p>	<p>of the last is imminent, according to information received from the LCBC, which has already received a copy of the letter of transmission. The process that will lead to the entry into force of the Water Charter is therefore likely to be underway by early 2024. If, however, the Water Charter does not come into force before the date set for the start of project activities, the participating countries will be required to sign, prior to the launch of field activities, a specific agreement including the implementation of the measures specified in the Charter.</p>
	<p>3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy of the Fund? Proponents are encouraged to refer to the Guidance document for Implementing Entities on compliance with the</p>	<p>Partially addressed.</p> <p>CR14: Please refer to section 14 above and address CR11, CR12 and CAR9</p>	<p>CR14: CR11, CR12 and CAR9 have been addressed accordingly.</p>

	Adaptation Fund Environmental and Social Policy, for details.		
	4. Is a budget on the Implementing Entity Management Fee use included?	<p>Partially addressed.</p> <p>The project document describes well the monitoring and evaluation arrangements and provides a budgeted M&E plan. However, since this project will be subject to the newly approved Adaptation Fund Evaluation policy, the document should outline its compliance with the new policy including the reporting requirements.</p> <p>CR15: Please ensure compliance of the M&E reporting and budget with the new evaluation policy. For example, the project currently doesn't include a baseline report that is required as per new evaluation policy.</p>	CR15: Table 27 revised in accordance with the New Evaluation Policy. The Baseline report was added as part of the M&E arrangements for Project Management.
	5. Is an explanation and a breakdown of the	Not yet	CR16: Table 27 revised in accordance with the New Evaluation Policy.

	execution costs included?	CR16: Please refer to CR15 above.	
	6. Is a detailed budget including budget notes included?	Yes	
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators, in compliance with the Gender Policy of the Fund?	Yes	
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	Not yet Please refer to CR15 and CAR10	Please see responses to CR15 and CAR10 .
	9. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	Not yet Please refer to CR9 and include the AF core indicators.	Please see response to CR9 .
	10. Is a disbursement schedule with time-	Yes	

	bound milestones included?		
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ADAPTATION FUND

FULLY DEVELOPED PROPOSAL FOR REGIONAL PROJECT/PROGRAMME

PART I: PROJECT/PROGRAMME INFORMATION

Title of Project/Programme: Integrated water resources management and early warning system for climate change resilience in the Lake Chad Basin

Countries: Cameroon, Central African Republic, Chad, Niger, Nigeria.

Thematic Focal Area ¹: Disaster risk reduction and early warning systems

Type of Implementing Entity: Multilateral Implementing Entity

Implementing Entity: World Meteorological Organization (**WMO**)

Executing Entities: Lake Chad Basin Commission (**LCBC**), Global Water Partnership Central Africa (**GWP-CAF**)

Amount of Financing Requested: 10'755'000 (in U.S Dollars Equivalent)

Letters of Endorsement (LOE) signed for all countries: Yes No

NOTE: LOEs should be signed by the Designated Authority (DA). The signatory DA must be on file with the Adaptation Fund. To find the DA currently on file check this page: <https://www.adaptation-fund.org/apply-funding/designated-authorities>

Stage of Submission:

This proposal has been submitted before including at a different stage (pre-concept, concept, fully-developed proposal)

This is the first submission ever of the proposal at any stage

In case of a resubmission, please indicate the last submission date: [8/21/2023](#)

Please note that fully-developed proposal documents should not exceed 100 pages for the main document, and 100 pages for the annexes.

¹ Thematic areas are: Food security; Disaster risk reduction and early warning systems; Transboundary water management; Innovation in adaptation finance.

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E. Describe how the project/programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist. If applicable, please refer to relevant regional plans and strategies where they exist. 33

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I. Describe the consultative process, including the list of stakeholders consulted, undertaken during project/programme preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund. 42

J. Provide justification for funding requested, focusing on the full cost of adaptation reasoning. 44

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PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME BACKGROUND AND CONTEXT:

The Lake Chad basin is highly vulnerable to the impacts of climate change due to its exposure to water-related hazards, and limited adaptive capacity of its communities. While national efforts are being taken to reduce the negative effects of extreme events such as floods and droughts, further action and regional collaboration at the transboundary scale are needed to build climate-resilient communities through integrated water resources management and climate adaptation measures, improved policies and practices, and an inclusive and participatory approach for end-to-end people-centred early warning systems.

Lake Chad is a major economic pillar for the six countries in the Lake Chad Basin Commission ([LCBC](#)). Climate change is adversely impacting the Lake Chad Basin, threatening the sustainable development of local communities. It is now certain that the average annual temperature in the region will be higher in the future, resulting in increased evapotranspiration and a complex range of impacts on the production systems and economy of the Lake Chad Basin. According to 6th Assessment Report of the Intergovernmental Panel on Climate Change ([IPCC, 2021](#)), drought frequency and intensity are also expected to increase in the Central Africa region. This, in conjunction with higher temperatures and increased evaporation, will very likely lead to further shrinkage of the lake. Extreme events will likely increase in frequency; more frequent droughts and flooding is expected to have negative impacts on food and water security, migration, and livelihoods in the region. Quality hydrometeorological data are crucial for understanding and documenting these impacts and associated vulnerabilities, as well as for the efficient management of water resources and for planning the optimal mobilization to meet all uses.

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The population in the Lake Chad Basin is highly vulnerable to the impacts of climate variability and change, including extreme hydroclimatic events such as floods and droughts. This pronounced vulnerability is largely attributable to high rates of poverty, financial and technological constraints, and an economy heavily reliant on climate dependent natural resources (such as agriculture and fisheries). The population in the region is projected to double in the next thirty years, putting further pressure on the water resources.

Against this backdrop, the project aims to increase the resilience of the population in the Lake Chad Basin by strengthening the country's capacity to manage and adapt to climate-related risks through improving meteorological and hydrological monitoring, data systems and service delivery, as well as raising awareness of climate-related hazards. In particular, the project will promote the integrated management of floods and droughts by improving the availability of hydro-climatological information through monitoring and data systems as well as forecast and prediction systems, thus contributing to climate resilience in the region. The timely availability of reliable hydrometeorological information, as well as the capacity to analyze this data, and plan and implement appropriate measures, is crucial for: i) early warnings of floods and droughts; ii) the preparation of effective climate and disaster protection/prevention measures; and iii) the implementation of adaptation measures to reduce medium- and long-term hydro-climatic risks. The approach will use modern and innovative tools and methods, covering from local to regional levels, with a focus on the "last mile" and a whole-of-society approach to ensure that the needs of the most vulnerable populations are addressed. Awareness raising and adequate communication of hydroclimatic risks at all relevant levels, as well as strengthening the capacities of the regional and national agencies are therefore a central element of the project.

I.1 - BACKGROUND

Lake Chad is a shallow endorheic basin located in West-Central Africa in the Sahelian region on the southern fringe of the Sahara Desert. It provides food and water to approximately 50 million people in 2020 ([Pham-Duc et al., 2020](#)) and supports unique ecosystems and biodiversity. By 2050, it is estimated to provide livelihoods for 129 million people (2.5 times more than year 2020). The countries within the catchment are: Algeria, Cameroon, Central African Republic (CAR), Chad, Libya, Niger, Nigeria, and Sudan. Lake Chad has been a centre of trade and cultural exchange for thousands of years between the populations of the northern Sahara and the south. As a host to migratory waterfowl, Lake Chad also plays a role in wildlife conservation. It offers very rich ecosystems in an arid environment and is therefore included in the Ramsar list of Wetlands of International Importance. However, over the last five decades, mainly due to climate change, the lake level has been steadily decreasing. Its surface area has shrunk from 25,000 km² to less than 1,500 km² ([Lemoalle et al., 2014](#)). This has led to tensions among riparian populations and concern that the lake could disappear.

Many studies have investigated the issue of the drying up of Lake Chad ([Olivry et al., 1996](#); [Maley, 2000](#); [Lemoalle et al., 2012](#)). The lake level has fluctuated considerably during the recent geological history (last 50,000 years), responding to changes in rainfall and temperatures caused by natural climate variability. Paleontological studies show that in the previous centuries it formed the Mega-Chad, which covered several hundred thousand square kilometres. It also dried up completely several times in the past.

At the end of the 1960s, Lake Chad had a surface area of 20,000 km² and a water level of 282m above mean sea level (Olivry et al., 1996). The lake water level depends closely on the climate elements such as precipitation. Because of its large surface area, shallow depth and location at the Sahara-Sahel interface, evaporation losses are very high. In normal periods, these losses are compensated for by rainfall, but due to climate change over the last few decades, evaporation is increasing while the rainfall input is insufficient. This has led to an increasing fluctuation of the lake size and extent during the last five decades with an overall negative tendency (Figure 1). This very high sensitivity to climatic conditions of the Lake Chad's hydrological systems makes it extremely vulnerable to climate change. Thus, already the IPCC 2007 report identified the Lake Chad Basin as one of the areas most affected by climate change with severe impacts on societies, economy and ecosystems, confirmed by the most recent report (IPCC, 2022).

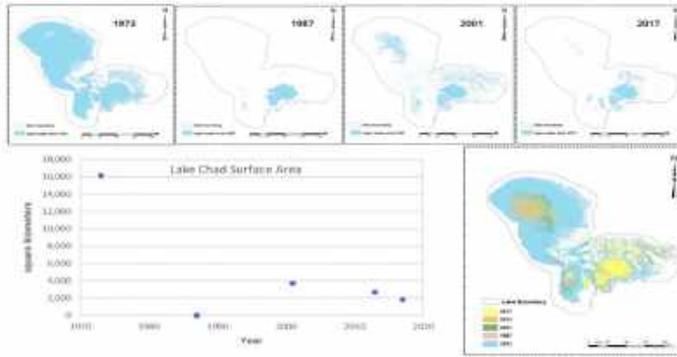


Figure 1. Changes in the surface of Lake Chad over the last five decades (Mahamat et al., (2021), modified).

Table 1 demonstrates the decline of the water level in the Lake Chad since 1970, as reflected in the changes of hydrometeorological parameters. The shrinking of Lake Chad is primarily attributed to a reduction in inflows, which is largely caused by decreased rainfall. Higher temperatures and lower relative humidity also contribute to the decline. As a result, the occasional rises in the water level of the lake over the last few decades followed by some major floods in the Logone and Chari rivers (1975, 1988, 1996, 2008, 2012 and 2019) are quickly absorbed and evaporated.

Table 1. Evolution of hydrometeorological parameters in the Lake Chad basin. The data are based on the CIMA International report (2012) (not publicly available online) on the transfer of water from the Congo basin to the Lake Chad basin.

Variable	Units	Until 1970	Since 1970	Difference
Mean level (compared to sea level)	m	282	280	-2 m
Inflow from the Chari-Logone	km ³ /year	47	21.7	-53.8%
Inflow from Komadugu-Yobe	km ³ /year	1	0.47	-53.0%
Average rainfall (Nguigmi)	mm/year	240	193	-19.6%
Average rainfall (N'Djamena)	mm/year	543	465	-14.4%
Average rainfall (Sarh)	mm/year	1079	958	-11.2%
Average rainfall (Bossangoa)	mm/year	1559	1419	-10.0%
Relative humidity (N'Djamena)	%	46	43	-6.52%
Average temperatures (N'Djamena)	°C	28	28.7	+2.50%
Average temperatures (Sarh)	°C	27.6	28	+1.45%

Water withdrawals for irrigation, drinking water supply, and livestock (Maga dams in Cameroon and several others in Nigeria on the Komadugu Yobe), have a minor impact on Lake Chad to date. According to many studies (UNEP, 2004; Lemoalle et al., 2012; Pham-Duc et al., 2020), irrigation withdrawals have only had modest impacts on the lake's ecosystem. However, the use of irrigation has increased quickly due to decreasing rainfall, especially after the 1970s, causing a decline in the water supply of the lake.

The decrease in the lake water level and inflow from tributaries has affected economic activities in the basin, including agriculture, fishing and pastoralism. Paradoxically, some populations have seen benefits from the shrinking of the lake, such as favorable conditions for agriculture and small livestock on the exposed lakebed. However, these benefits do not outweigh the overall negative impacts. Northern nomadic livestock breeders have been forced to move their herds to the wetter south due to the drying conditions, which sometimes leads to conflict with farmers. These climate-driven issues of poverty and food insecurity are further exacerbated by other environmental factors, such as soil salinization, the spread of invasive plant species and an increased risk of pollution from the use of agricultural chemicals.

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I.2 - GEOGRAPHICAL AND HYDROCLIMATIC CONTEXT

I.2.1- Geographic and institutional context

The Lake Chad catchment is located at the southern edge of the Sahara Desert between latitudes 6 and 24 N and longitudes 7 and 24 E. The topographic basin area is nearly 2.4 million km² and 60% of which is in the arid zone (see later **Figure 3**). The countries sharing the Lake Chad Basin are Algeria, Cameroon, Central African Republic (CAR), Chad, Libya, Niger, Nigeria, and Sudan.

Table 2. Area of conventional basin in the LCBC member countries. (Source: LCBC)

Country	Basin area (km ²)
Cameroon	56,800
CAR	197,800
Niger	231,375
Nigeria	205,000
Chad	361,980
Libya	5,100
Total	1,058,055

However, the area of intervention of LCBC covers the active basin, also called the 'New Conventional Basin', which extends over an area of about 1 million km² (**Table 2**), between latitudes 5° and 16°N and longitudes 7° and 24°E. The project will benefit Cameroon, Central African Republic, Chad, Niger, and Nigeria, which are part of the LCBC's intervention zone. It should be noted that the Algerian part of the basin is hyper-arid and is therefore not part of the active basin, while Sudan is part of the active basin but not a member of the LCBC, but its contribution to runoff (0.08 km³/year) is limited. Libya is a LCBC Member State, however its contribution to runoff is also very limited.

I.2.2 - Climate and environmental context

The Lake Chad Basin is located in a region that experiences a range of climates, from the Sudanian climate with 6 months of rainfall per year in the south to the desert climate with practically no rainfall in the north. The rainy season is characterized by extreme spatio-temporal variability of rainfall, while the dry season is very distinct, with no rainfall at all. The active Lake Chad Basin is divided into four different climatic/ecosystems zones based on the amount of the annual rainfall, as shown in **Table 3**, from north to south.

Table 3. Climate zones and activities of the Lake Chad Basin.

Climate zone	Average annual rainfall	Main activities
Saharan	< 200mm/a	Nomadic livestock farming
Sahelo-Saharan	200 – 450mm/a	Transhumance zone
Sahelo-Sudanian	200 – 600mm/a	Agriculture and livestock farming
Sudano-Sahelian	600 – 1500mm/a	Maize, cotton and rice are grown

Paleo-climatic studies ([Tilho, 1928](#)) show that Lake Chad has experienced significant natural fluctuations in the past. During the 11th, 12th and 17th centuries, the water level reached very high levels. In the recent quaternary it covered 340,000 km² and reached 160 m in depth. However, the lake also reached very low levels in the past, notably in the second half of the 15th century and early the 20th century. The climate of the region is generally characterized by a very pronounced decadal and multidecadal natural variability in rainfall ([Lüdecke et al., 2021](#)), and climate change is aggravating the already challenging climatic conditions by increasing the frequency and magnitude of extreme events. The current and projected warming is increasing evapotranspiration, while rainfall projections for the region are very uncertain, but suggest that extreme rainfall will increase while overall precipitation decreases, and longer droughts are very likely ([IPCC, 2021](#)).

In recent times, and particularly since the 1970s, the Lake Chad Basin has experienced significant changes in the rainfall regime, with the isohyets shifting about 180km to the south over the last five decades. This has resulted in a significant reduction in annual rainfall amounts. For example, some areas in Bol locality in Chad close to the lake, which used to receive 300mm/year of precipitation, have experienced an annual reduction of about 100mm (-33%). Similarly, N'Djamena, the capital of Chad, has suffered a loss of 200mm out of its annual total of 600mm. However, some areas have reported a slight recovery in rainfall since the 1990s.

The Lake Chad Basin is mostly in the Sahelian and desert zones and is characterized by remarkably high temperatures, very low relative humidity, and very high evaporation rates (1500 to 2500mm on average per year). Maximum temperatures can exceed 43°C in N'Djamena in April and May, with minimums of around 12 to 13°C in January. The average annual insolation is around 3100 to 3200 hours in N'Djamena, with total evaporation on Lake Chad evaluated between 2100 and 2300 mm/year ([Olivry et al., 1996](#)).

Like in other parts of the sub-region ([Sighomnou, 2004](#)) and the world, the impact of climate change is reflected in an increase in temperature. Thus, the maximum temperatures recorded in N'Djamena (**Figure 2**) between 2001 and 2020 have increased by an average of 1.053°C compared to the general average for the period 1950-2020.

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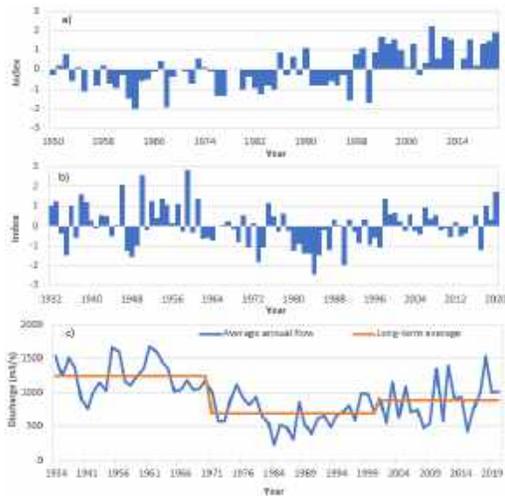


Figure 2. a) above: Variation of maximum temperature indices in N'Djamena (1950-2020) b) middle: Variation of precipitation indices in N'Djamena (1932-2020), c) bottom: Average annual flow of the Chari at N'Djamena 1934-2020.

Natural environment and ecosystems: The physical environment of the Lake Chad basin is characterized by decreasing rainfall from South to North, resulting in diverse range of habitats, including desert, shrub steppe, savannah, and forest. The dominant feature of the basin's environmental is the presence of numerous wetlands, which are recognized as hotspots of biodiversity. These habitats are home to unique fauna and flora. LCBC State of the Lake Chad Basin Ecosystem Report (LCBC, 2012), estimated 130-209 species of mammals and over 500 species of birds found in the basin, hundreds of thousands of which migrate and use the wetlands for periodic stays. The wetlands of the basin are also notable for their abundant fishing potential, with an estimated 120-140 fish species present. The Waza-Logone floodplain in Cameroon (Yaéré) alone has 56 fish species. More than 30 geographical areas within the basin have been designated as protected areas by the LCBC member States.

Depending on their spatial location, the wetlands of the basin are characterized by their diversity, which depends on their origin, the climatic zone in which they are located or the origin of their water supply, as well as on their duration and annual functioning, but also on their physical and chemical characteristics. These different parameters condition the installation of varied ecosystems, characterized by a significant biodiversity in their respective environmental contexts, more or less long occupied by man and integrated into local, national and regional economic activities. Like other wetlands, those in the Lake Chad Basin

provide numerous ecosystem services, recognized by nature protection mechanisms and institutions working for sustainable development, such as the World-Wide Fund for Nature (WWF), the International Union for Conservation of Nature (IUCN). Lake Chad and its wetlands are also recognized as an international wildlife conservation area, playing a critical role in biodiversity conservation as a migratory oasis for waterbirds. These ecosystems are rich in natural resources and support livelihood systems that include fishing, hunting, berry picking and agriculture. The wetlands also play a crucial role in buffering floods and hence increasing climate resilience.

The wetlands of Lake Chad Basin are highly vulnerable to the impacts of climate change, especially those in Sahelian zones. One of the main effects is desertification, which forces populations to migrate towards watering holes. This displacement of populations combined with the high population growth results in the basin's wetlands facing increasing competition for resources between multiple stakeholders. The basin's vulnerability is aggravated by the generally shallow topography of Lake Chad itself. Indeed, the variation of precipitation and evaporation (linked to temperature gradients) affects the hydrological regime and the dynamics of river floods and the ecological functioning of the lake and the other wetlands of the basin. This variability and these environmental changes favour the development of production systems based on the mobility of resources and people, multiple economic activities within families and the multifunctionality of spaces. The complementarity between rainfed and flood recession agriculture, livestock breeding, fishing and gathering favours a relatively productive system that contributes to the resilience of populations to the impacts of climate change. However, the social and environmental changes observed in the region over the last five decades are challenging the entire system, in particular the traditional rules of access to natural resources. Other adaptation solutions are therefore necessary. They imply an analysis of the changes that requires precise knowledge of the variability and availability of resources. Therefore, better knowledge of these ecosystems and their functioning should be a priority in order to preserve them effectively and improve their management. The results of this project, together with those of many others such as LCBC's BIOPALT project executed by UNESCO, should allow to feed the ongoing reflection on the subject, with a view to developing relevant public policy action strategies on the climate issue in a context of high climatic and geopolitical insecurity such as that of the Lake Chad Basin.

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1.2.3 – Hydrology



Figure 3. Lake Chad and its main tributaries.

The hydrographic network of the Lake Chad Basin is not dense and includes only the lake itself and two sub-basins, the Chari-Logone sub-basin shared by Cameroon, Chad, CAR and the Darfur province in Sudan, and the Komadougou-Yobe sub-basin on the Niger-Nigerian border. In addition to these systems, there are floodplains between the highlands and Lake Chad that play an important environmental role, such as the Waza-Logone plain. However, two thirds of the catchment area is located in arid zones and contributes very little to the supply of Lake Chad. The hydrologically active part of the basin covers about 1,000,000 km², of which 600,000 km² is the Chari-Logone system. The main tributaries to the lake are the Komadougou-Yobe in the West and the Chari-Logone system in the East, while the Bahr el Gazal from the north contributes little water but it provides an outlet for overflow in high water years (Figure 3).

The natural water balance of the lake depends on the inflows that come from the Chari-Logone River system (80 to 85%), from the precipitation (between 7 and 14%) and from the small tributaries, including the El Beid and the Komadougou-Yobe, which only provide a little less than 4%. The size of the lake is therefore very largely determined by the water inflow from the Chari-Logone system, including rainfall in the mountainous regions bordering the basin in the south in the Central African Republic and Cameroon, but also by temperatures, the effects of which in terms of evaporation losses are in the order of 2 to 2.5 m/year.

The Chari-Logone system has a basin area of about 590,000 km². The Chari and Logone rivers originate, respectively, in the mountainous regions of the Central African Republic and Cameroon, which receive more than 1,200mm of rainfall per year. Both rivers have a tropical regime, with a single flooding period towards the end of the rainy season between August and November. As a result, the lake reaches its maximum water levels between the end of November and the end of January and its minimum in July. The Chari-Logone system also sustains vast wetlands, including the 8,000 km² Yaéré floodplain in Chad and Cameroon, during wet years.

The Logone and Chari rivers converge in N'Djamena and join Lake Chad 130 km later. The annual river flow data since 1932 at the hydrometric station of N'Djamena gives a good estimate of the variability of the water supply to Lake Chad (Figure 2). In Figure 2, the average annual flow of the Chari at N'Djamena, which was around 1200 m³/s, fell to around 600 m³/s between the 1970s and 2000 (-50%), and slightly rose above 800 m³/s after the 2000s. This decrease, which leads to a significant variation in the surface area of the lake, is proportionally more significant than the decrease in rainfall in the basin. The rivers amplify the decrease in rainfall and impact the availability of water in the basin. The data in Table 4, illustrates the situation.

Table 4. Average rainfall in the basin and runoff of the Chari since 1950 (Lemoalle et al., 2014).

Period	Basin rainfall (mm/a)	Runoff	
		Discharge (m ³ /s)	Volume discharged (km ³ /a)
1950-59	1114	1334	42.1
1960-69	1059	1278	40.3
1970-79	929	866	27.3
1980-89	877	561	17.7
1990-99	974	688	21.7
2000-09		672	21.2

Thus, the inflow from the Chari-Logone system, which was estimated at more than 40 km³/year in the 1940s to 1970, fell to an average of around 20 km³/year after 1970. However, as seen from the rainfall indices time series for N'Djamena (Figure 2), even though there are still some years with large deficits, rainfall has shown an overall upward trend since the 1990s. This trend was also highlighted in the latest report of the Intergovernmental Panel on Climate Change (IPCC, 2021). It should be noted, however, that the increase in rainfall is not accompanied by a proportional improvement in runoff conditions, as has already been noted in other basins (Olivry, 1993). The situation is therefore quite complex and requires careful hydroclimatic monitoring for a better understanding.

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1.2.4 - Lake Chad and its different states of variation

Lake Chad is composed of two basins, the South and North basins, separated by a shoal area known as the "Great Barrier". The variability of Lake Chad, both on a geological scale and on an annual and seasonal scale, is directly linked to rainfall variations in its catchment area. [Tilho \(1928\)](#) classified the lake into three main states based on the annual inflow from the Chari-Logone system: Great Chad (annual inflow greater than 43 km³), Normal or Average Lake Chad (annual inflow between 34 and 43 km³) and Small Chad (annual inflow less than 34 km³). In the wet season, the level of the Lake is high enough (altitude of 282.3m) for the Great Barrier to be permanently submerged. The Lake is then formed by a vast single body of water bordered by an archipelago on its eastern shores.

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The last Great Chad stage dates from the mid-1950s ([Lemoalle et al., 2014](#)). Depending on the rainfall variations, the Normal or Great Chad sequences are interspersed with low-level phases. Three phases of Small Chad have occurred since 1900, the first (1904-1915) and the second around 1940. The third change to a Small Chad occurred in 1973, and since then the lake has been under this regime. During this drought period, the water level remained low and the resurfacing of the Great Barrier separates the two basins, whose levels evolved in different ways. In the context of the recent drought, a new state of the Lake, Small Chad dry (when the inflow from the Chari-Logone system less than 15 km³/a), has been defined. In this state, the northern basin does not receive any recharge from the southern basin and remains dry throughout the year.

Between 1957 and 2008, the Lake was in a Small Chad or Small Chad dry state two-thirds of the time and in a Normal Chad or Great Chad state one-third of the time. The Lake expanded to 26,000 km² in 1963, but the large inflows of the early 1960s were quickly neutralized by the drought of the 1970s-2000s.

1.2.5 - Groundwater

Little is known about the groundwater availability, quality and usage in the Lake Chad basin, but it is thought to be abundant and fed by infiltration through the lakebed and surrounding wetlands. This is the main source of water supply for the majority of the basin's population, especially in the northern Chad. Improving the knowledge of the basin's groundwater is required as pressure on the resource is constantly increasing. Noting that there are other ongoing projects addressing groundwater aspects, this proposed project will complement whenever required. Better data acquisition will improve the understanding of the hydrogeology of the whole basin, including aquifer recharge, surface and groundwater interactions, flow, and water quality. There is a regional project ongoing by the Institute for Geosciences and Natural Resources, Germany ([BGR](#)) and synergies with this project can be found.

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The regionally important groundwater resources in the Lake Chad Basin are represented by two aquifer systems ([Olivry et al., 1996](#)):

- The water table in the quaternary sand or sandy-clay deposits, at depths ranging from a few meters to about fifty meters. This aquifer system is about 30m thick and is hydraulically connected to Lake Chad ([Carmouze et al., 1983](#)). Its reserves are estimated at 150 km³. The quality of the water is considered satisfactory for the water supply of the population and livestock;
- The Pliocene aquifer, sometimes confined and often artesian, has only been recognized in the central part of the basin. It is about 60m thick and is found at a greater depth (sometimes between 250 and 400m). This aquifer is well exploited in Nigeria and in the far north of Cameroon, where numerous boreholes drilled in the 1960s exploit it permanently. Its waters are older and more mineralized than those of the water table.

Apart from these two aquifers, there are other artesian layers at great depths whose extent and capacity are not well known. These are generally highly mineralized fossil waters with very limited uses.

1.3 - SOCIO-ECONOMIC SECTORS

Given the economic, social, and environmental role of Lake Chad, preserving its economic potential is crucial for supporting the development of the riparian populations and reducing tensions over water resources. However, current information on these subjects is limited. For example, due to differences in census data across the LCBC countries, it is difficult to provide official data on the population in the Lake Chad basin. Based on the latest data and population growth rates provided by the [World Bank](#), the LCBC estimates the basin's population at around 50 million in 2020. With its fast-growing rate, the population is projected to reach 129 million in 2050, i.e., 2.5 times more than today. The regions with the highest population densities in the basin are in Chad (N'Djamena), Nigeria (Kano and Maiduguri) and Cameroon (Maroua and Kousseri).

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Table 5 provides some insights into the socio-economic data (development indicators, population) of the countries in the basin. The majority of the basin in each country is rural and often more affected by poverty than the cities. In Niger,

for example, 86% of the poor population lives in rural areas, with 36% considered extremely poor. Inequalities also exist, with women and children being particularly vulnerable. In 2019, all the countries in the basin were ranked in the lowest group based on the Gender Development Index (UNDP, 2019).

Table 5. Lake Chad Basin: GDP and GHI by 2022 (Source: WB)

Country	GDP (million USD), 2022	World Hunger Index rank, 2022
Cameroon	43,644.07	80th
CAR	2,382.62	120th
Niger	12,704.15	115th
Nigeria	15,342.28	103rd
Chad	472,624.60	117th

1.3.1 – Social aspects

The Lake Chad Basin is home to diverse range of ethnic groups, numbering approximately 70, with a variety of religious beliefs including Christianity, Islam, and animism. Each ethnic group has its own unique culture, language, and economic activity. The groups can also cross national borders.

The ethnic makeup of each country in the basin varies, with Chad being home to 12 ethnic groups, the main being the Sara, mostly settled in the south and practicing mainly agricultural activities, the Boudouma (fishermen), the Arabs (breeders), the Massa and the Moundang (herders-sedentary).

In Southern Niger and Northern Nigeria, the majority of population consists of the Hausa and Fulani (Foulbés or Foulanis), strongly influenced by Islam. Bringing together around 30 million individuals, they are majority throughout the pastoral zone. However, the Kanuri are the dominant ethnic group in the Nigerian part of Borno State.

Northern Cameroon is home to a range of ethnic groups and religions, including Muslims, Christians, and animists, with the Fulani being the dominant group. These populations are farmers millet (sorghum), goat, sheep and zebu breeders. During the field consultation process, it was also found at the tip of the country the Arabs, the Kotoko, the Massa, the Sara as well as other ethnic groups in common with Chad.

The Central African Republic is home to more than twenty ethnic groups, including the Gbaya in the center and west, as far east as Cameroon, and the Banda in the northeast, in the Aouk region, predominantly Christian. The Sara (Ngama, Mbaye and Kaba), northern ethnic groups linguistically distinct from the two first, are settled along the northern border with Chad. The Mbororo (Fulani), with a Muslim majority, are found in the pastures of the north and center of the country.

1.3.2 – Economic activities

Lake Chad is an important economic center for the populations in the basin and the surrounding region. Its rich biodiversity has enabled the development of productive activities based on fishing, agriculture and livestock breeding, which are capable of adapting to climate variability. In 2014, around 2 million people lived on the shores and islands of Lake Chad (LCBC, 2015). In wet years, the area provides food supply for about 13 million people, including two regional metropolises, N'Djamena, the capital of Chad, and Maiduguri, the capital of Bornou State in Nigeria. Table 6 lists the sources of household income in the basin. It should also be noted that there is a strong demand for the transport of goods and people on the Chari and Logone rivers and on Lake Chad. Navigation by large vessels, practiced in the 1960s between Bol and N'Djamena, is today only possible in years of very high-water levels. However, some seasonal commercial navigation is still practised towards Moundou, Sahr and upstream on the Chari, as well as towards the localities of Pouss, Bongor and upstream on the Logone. There are also sites with high tourist potential, such as Waza, Kalamaloué, and Lake Fitri, and others that produce traded goods like the Acacia for gum. These economic activities are highly sensitive to climate change.

Table 6. Sources of household income in the basin. (Source: www.cblt.org)

Activity	Revenues (\$US x 10 ⁹)
Fisheries	45.1/a
Rainfed and flood recession agriculture	26.6/a
Livestock industry	14.7/a
Small-scale irrigation	10.8/a
Large-scale irrigation	9.4/a

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Fisheries: Fishing is widespread in Lake Chad, the dams and on its tributaries, especially in the floodplains. The production of the floodplains depends mainly on the magnitude and the duration of the floods, which provide a safe and food-rich environment for young fish. Fishing is a primary, secondary, or occasional activity and the most important source of household income. Men are mainly involved in selling smoked fish, while women are responsible for processing and selling fish in small restaurants (LCBC, 2016). In the early 1970s, annual fish production was around 130,000 - 141,000 tonnes, but declined due to decreased flooding in the wetlands.

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Agriculture: Agriculture is the primary activity of the population in about 60% of the administrative units in the Lake Chad Basin. There is a distinction between rain-fed agriculture, flood recession agriculture, and irrigated agriculture at the level of the dams in Cameroon and Nigeria. The most common crops are cotton, groundnuts, sorghum, wheat, millet, maize, and rice. Both traditional and modern farming methods are used.

The irrigation potential of the conventional basin is estimated at over 1.1 million hectares, of which barely one tenth is actually irrigated. However, developing the full potential would require 16.53 km³ of irrigation water, or about 80% of the total current inflow to the lake. Recessional agriculture takes advantage of the soil moisture retained in the floodplains and around the lake that recedes every year. Despite the shrinking of the lake, some local people are resistant to filling of the lake because the drying has revealed fertile land, providing income. Rainfed agriculture is practiced in the Sahelo-Sudanian and Sudano-Sahelian regions where rainfall varies between 400 and 1500 mm/year.

Livestock: Livestock farming is extensive throughout the basin and involves seasonal migration. Livestock herds have grown rapidly since their decline during the 1970s and 1980s droughts. The migration routes are cross-border, from north to south around Lake Chad and the floodplains during the dry season and from south to north during the rainy season. Around 10% of the economically active Chadian population in the basin, is engaged in cattle, sheep and goat rearing. Meat and live cattle are Chad's second most important export product after cotton. Women are predominantly involved in the raising poultry and small ruminants, while men are responsible for larger livestock (Annex 4 on Gender Assessment).

1.4 - MAIN ISSUES AND CHALLENGES IN THE LAKE CHAD BASIN

The Lake Chad Basin, which is characterized by high demographic growth and high hydroclimatic variability, is emblematic of the challenges posed by climate change in the least developed countries. It is one of the most threatened ecosystems in Africa, combining hydroclimatic variability, ecological ecosystem richness and vulnerability, socio-economic (production of food resources and employment) and political (governance, security) issues. The prolonged droughts since the 1970s have severely impacted the environment. For example, the increasing variability in the rainfall patterns is making it difficult for the local population, who are dependent on natural resources, to know when to plant crops or shift to alternative livelihoods. This has further increased the vulnerability of the already impoverished rural population.

1.4.1- Challenges related to hydrometeorology and groundwater monitoring

The hydrological observations in the Lake Chad Basin began in the early 20th century, with setting up of basic infrastructure during the colonial era, in particularly by ORSTOM (Office de la Recherche Scientifique Outre-mer, now IRD, Institut de Recherche pour le Développement) in Cameroon, Central African Republic, Niger and Chad. The observation networks were gradually built up and maintained by the administrations of the various countries until the early 1980s. In Nigeria, on the other hand, there is no single National Hydrological Service (NHS), but hydrometric activities are carried out by a multitude of institutions.

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However, budget cuts in the 1980s and 1990s led to the abandonment of many hydrometric stations, compromising hydrological monitoring in some countries. Observations are sometimes resumed periodically, in the context of specific projects. Many of the NHS from the region have reported vandalism problems at their stations.

The observation stations of the National Meteorological Services (NMSs) have also been reduced to a minimum and do not undergo regular maintenance. Like the NHSs, they face the problem of lack of human, financial and infrastructure resources to carry out their tasks properly.

Thus, the National Meteorological and Hydrological Services (NMHSs) of the Lake Chad Basin Commission Member States are not well equipped to monitor, forecast/predict and document climate change impacts. The WMO has defined four categories of meteorological, climatological and hydrological services into which the NMHSs fall according to the level of services they are able to provide and the resources required to provide these services (WMO, 2015). Apart from Nigeria (Table 7), the NMHSs are mainly in category 1, i.e., providing only basic services such as data collection and archiving. Niger is classified as category 2 as its NMHS also provides seasonal climate outlooks and climate monitoring. The need for improving countries' ability to produce services related to water, weather and climate is evident.

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Table 7. Categorization of NMHSs in the provision of meteorological, climatological and hydrological services. (Sources: ECCAS, 2020 and ECOWAS, 2018)

	Cameroon	CAR	Chad	Niger	Nigeria
Meteorological Services	Category 1 - Basic	Category 1 - Basic	Category 1 - Basic	Category 2 - Essential	Category 4 - Advanced
Climatological Services	Category 1 - Basic	Category 1 - Basic	Category 1 - Basic	Category 2 - Essential	Category 4 - Advanced
Hydrological Services	Category 1 - Basic	Category 1 - Basic	Category 1 - Basic	Category 2 - Essential	Category 3 - Full

The inadequate training and resources of NMHSs in the region to document climate change is a major hindrance to effective water resources management and the optimal allocation of resources to meet various needs, as well as to mitigate water-related risks. In particular, the period of discontinuous observations had a major impact on the quality of the data and to the calibration of the stations. Therefore, the stage-discharge relationship should be reconsidered and validated at all stations. This is especially concerning for the Lake Chad basin, where tributaries with torrential flows regularly become silted up. Some of the rating curves currently used by the NHS for stage-discharge relations are outdated or unreliable, severely impacted by the lack of measurements and hindering effective water resources management. With changing conditions, regular discharge measurements are crucial.

Groundwater: Groundwater constitutes 80% of the basin's water resources, but there is limited knowledge about it and its management is embryonic. Water resources management and assessment, including policies and regulations, in the Lake Chad region have focused mainly on surface waters. Groundwater is the main source of drinking water in the basin and its agricultural use is increasing. [The current use of groundwater resources is exposed to adverse impacts of climate change, with studies having shown a decline in the volumes of the Pliocene aquifer as a result of inadequate recharge caused by decreases in rainfall \(TDA, 2018\)](#).

However, the knowledge of groundwater resources in the region is low, and many major aquifers are transboundary and face challenges such as:

- Decreasing water table due to pumping and/or reduced rainfall
- Contamination of groundwater by urban wastewater, with a public health issue, as observed in some large cities in the region ([Fantong et al., 2020](#))
- The potential substitution of surface water with groundwater during low water periods, including ensuring environmental flows in rivers.

Apart from the work carried out by the [Sahara and Sahel Observatory](#) on the shared Iullmeden aquifer, there has been no effort to promote regional cooperation on shared groundwater. However, the LCBC is currently implementing two projects (one funded by ADB-GEF and the other by the German cooperation - BMZ) to enhance the knowledge of groundwater in the Lake Chad Basin (see **Table 13** below).

Institutions dealing with groundwater in the countries are different from the NHS and under different ministries in some countries. This situation leads to a dispersion of efforts and serious problems of operational integration and global strategy at national and regional levels. The available and exploitable data at the basin level do not allow for a consistent assessment of the temporal changes of groundwater quantity and quality, particularly following the decrease in rainfall since the 1970s.

1.4.2- Challenges related to climate change and its impacts

Climate change is a pressing issue globally, and particularly so in the Lake Chad Basin, where economies are heavily dependent on water availability. This is evident in the National Adaptation Programmes of Action ([NAPA](#)) and National Adaptation Plans ([NAP](#)) of the five countries of the region and their commitment to adapting to climate change. The main economic sectors, such as agriculture, livestock breeding and fishing, are also impacted by climate change.

Studies show that armed conflicts in the Lake Chad Basin, which affects large areas ([adelphi, 2019](#)), are exacerbated by the effects of climate change and will further intensify them and threaten people's lives and livelihoods. Soils are losing their fertility due to the combined effect of anthropogenic land degradation and heat-related loss of soil moisture and biomass. Under these conditions, any efforts towards stabilization the region, peace-building, and sustainable development must consider the interplay with climate change and future scenarios. Furthermore, the increasing risks associated with climate change may reinforce cycles of violence and hamper prospects for stability. Efforts to support adaptation to climate change, build resilience to climate shocks and improve natural resource management can therefore be a vehicle for peacebuilding. Long-term planning, based on accurate scientific data, is essential for improving

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agricultural practices and natural resource management in general, in order to prevent future disruption and potential conflict.

The Lake Chad Basin is an extremely important ecosystem in a drought-prone environment located on the edge of the desert, home to a large and vulnerable population. It is vital to study and predict the impacts of climate variability and long-term changes on water resources. This might include analyzing approaches that would alter the natural functioning of Lake Chad, such as dams and irrigated areas, which require a sound data and science basis. While noting that these studies will not be carried out in the framework of the proposed project, data will be generated from the activities under the proposed project that are critical for such studies.

Climate variability is highly heterogeneous in space, and global models are unable to simulate river system dynamics at scale of the Lake Chad basin with sufficient accuracy. Understanding of climate variability and change impact on the availability of water resources requires in-depth understanding of the spatial and temporal variability of hydroclimatic regimes at the basin scale. Reliable and high-quality hydroclimatic data, including water level, discharge, rating curves, precipitation, and temperature, are essential for this purpose. Therefore, quality control, validation and data rescue (digitizing) of all hydrometric data from participating countries are needed.

One noticeable impact of climate change is the shift of the isohyets of the Saharan and Sahelian climatic zones in the Lake Chad basin 180km south. This has resulted in a reduction in agricultural and pastoral areas, causing people to move southwards towards more favorable conditions. This intensifies pressure on resources for agriculture, fishing and livestock farming, exacerbates conflicts, reinforcing inequalities and discrimination among populations, especially for those at the intersection of gender and social class.

Future climate change and its potential impacts: Climate change is often cited as a major factor affecting state of the environment in the Lake Chad Basin, including impacts on various sectors, such as agriculture, fishing, vulnerable populations in urban areas, migration, and the possible disappearance of the Lake. Climate change impacts differently on men and women, as their roles in society differ. Climate change may worsen existing gender inequalities by aggravating the vulnerability and adaptability of women to its impacts. For example, during droughts, the increased demand for water and fuel for cooking and subsistence can increase the time women spend on these tasks, limiting their availability to participate in education or income-generating activities ([WEDO, 2007](#)).

According to the [IPCC](#) report, projections of precipitation trends in the Lake Chad Basin are highly uncertain and the direction of trend is unclear ([LCBC, 2015](#)). This uncertainty also remains in the latest IPCC Assessment report in regards to changes to the West African monsoon system ([IPCC, 2021](#)).

There is high confidence that the average temperature will increase in the future, resulting in higher evapotranspiration and complex effects on the Lake Chad Basin's production systems and economy. The Lake Chad Climate Change Development and Adaptation Plan ([GIZ, 2015](#)) predicts an increase in evaporation from Lake Chad of 0.3 to 0.6 km³/year, depending on the scenario considered (B1, global average temperature increases of 2°C or A2, increase of 4°C by the end of the century). In agriculture, such a temperature increase should result in a shift towards cultivating plant varieties better adapted to the new climatic conditions. The models also converge towards a negative impact of temperature on productivity in the lake area, although farming practices, economic, social and political conditions will also play a role.

Furthermore, even if no trend can be identified in average precipitation, it is likely that extreme rainfall events and severe droughts will be more frequent ([IPCC, 2021](#)). This exacerbates the effects of the basin's already high interannual variability, and development policies must take this into account. Improved governance of the basin's water and natural resources is essential to preserve its productive potential. The LCBC and its member countries must therefore develop their capacity to mobilize, analyze and disseminate environmental information to facilitate decision-making, steering and participation in public policies. In particular, the LCBC must be able to plan and enforce the sharing of the basin's water between member countries and between uses and users. An improvement of the hydrological model of the basin (which requires access high-quality hydrological cycle data) is therefore essential to take into account the increase in temperature and the resulting evapotranspiration. Improvement of hydrological model will give an opportunity to refine development options like water transfer from the Congo basin.

The population of the basin is projected to more than double by 2050. This rapid demographic growth, combined with the movement of populations and the multifunctionality nature of the area, leads to conflicts that result in social exclusion with young people, women and the poor excluded from the best land. These tensions could increase further if access to resources is hindered by climate change. To mitigate these challenges, a better understanding and management of resources and production systems is required, which include documented rules, effective planning, and equitable access to the natural resources of the basin.

The [Water Charter of the LCBC](#) defines rules for sharing water between States, upstream and downstream, sub-basins, uses and users, balancing economic development and environmental preservation. It also includes wetland and groundwater management rules and support for civil society engagement on environmental issues. Its implementation is unfortunately delayed due to the fact that some countries have not yet submitted the instruments of ratification for the Charter to enter into force.

To better address these issues and propose solutions, the LCBC and its member countries developed two project proposals in the 2010s: the [Lake Chad-HYCOS project](#) in collaboration with WMO and the [Early Warning System project](#) with GWP-CAF. In line with its strategic action plan including climate issues, the LCBC requested these two institutions to assist in developing a combined project to revive Hydromet monitoring activities for improved water management and to establish an early warning system (EWS). This collaboration between the institutions and the LCBC is a powerful alliance to promote the exchange of experiences between partners to ensure that the expected results of the present project are achieved.

1.4.3 - Challenges related to the knowledge and prevention of climate risks

The Lake Chad basin is prone to floods (both fluvial and flash), droughts and sandstorms. Indeed, despite the prolonged drought recently, the Lake Chad Basin has also experienced significant floods, the most well-known on the Logone and Chari rivers in: 1975, 1988, 1996, 2008, 2010, 2012 and 2019. According to information from [EM-DAT's international disaster database](#), 48 of the 314 disasters (15%) related to severe hydro-meteorological phenomena in the five project countries, concerned the Lake Chad basin in 1970-2020. During this period Lake Chad shrunk from 25,000 km² to about 2,500 km². The distribution of these 48 disasters is shown in **Table 8**.

Table 8. Natural disasters affecting the Lake Chad basin 1970-2020.

Nature of event	Number of events	Number of people affected	Number of deaths
River flooding	28	3,086,625	643
Flash floods	4	362,469	107
Drought	16	27,906,308	3,001
Total	48	31,355,402	3,751

The data in **Table 8** show that two-thirds of these disasters were flood related in the past 50 years. These extreme events have affected over 30 million people (0.63 million/year), including nearly 4,000 deaths (75 deaths/year). Droughts affected the largest number of people (90% of the total). The impacts of these extreme events are becoming more devastating due to an increase in both their frequency and intensity, as well as the growing vulnerability and exposure of the region.

However, while floods cause significant damage in the inhabited areas of the basin, particularly in urban areas (N'Djamena, Kousseri, Sarh, Moundou, Bongor), a large part of the region's rural economy depends on annual flooding of the Logone and Chari river flood plains, and banks of Lake Chad. This ambivalence of the flood situation complicates their management and makes it highly necessary to have a thorough knowledge of the hydrodynamics of the rivers and hydrometeorological data.

In May-June rainy season starts in the upper basin of the Logone-Chari and raises floods to the periodically floodable plains along the two rivers in August-September, before filling of Lake Chad between October and January. The level and duration of flooding in the floodplains play a key role in their productivity and hence in the livelihoods of the people in the basin. In addition to fish production, the flood recession crops, and the quality of dry season pastures depend on the floods in the plains of Logone and Chari rivers, which also play an important role in recharging the water table. Therefore, effective flood forecasting for the Lake Chad Basin is essential for disaster prevention, managing the basin's livelihoods and, their resilience to climate change.

On the other hand, the droughts in the 1970s and 1980s have led to a reduction in groundwater recharge and a significant impact on the natural environment and the entire production system. The decrease in the flow of the main tributaries has led to a significant reduction in the size of the lake, to the point where complete disappearance is possible. This has led to a Small Chad stage (insufficient to feed the northern basin), which negatively impacts the livelihoods of 500,000 people and threatens the food security of about 4 million people. The drying up of the northern basin also leads to migration towards the south, which can lead to increased pressure on resources and conflicts between populations.

Flash floods occur mainly in mountainous areas such as the Mandara Mountains in Cameroon, or in the arid or semi-arid areas of northern Chad. Rivers with a torrential regime (*Mayo* in northern Cameroon or *Oueds* in Chad and Niger) are dry most of the time and only flow during the rainy season or during exceptional rainfall. Effective real-time rainfall monitoring is therefore essential.

Status of Forecasting and Early Warning Systems: Effective civil protection systems are built around a value chain that links monitoring (data collection systems) and modelling to concrete services provided to different sectors of the economy and populations. Participating countries in this project have national and regional platforms/forums and multidisciplinary working groups, but they are not very effective. The States have mainly focused on rescue, assistance, and rehabilitation after disasters, especially droughts and floods. This project aims to contribute to the improvement of these efforts. The main stakeholders include NMHSs and the service in charge of Civil Protection (for the implementation of a multi-hazard warning system), but also the services in charge of Food Security, etc. Overall, warning procedures for climatic risks, notably floods and droughts, need to be developed or improved. The main difficulties include lack of accurate and usable, accessible hydroclimatic information to decision-makers, and inadequate relationships between hydroclimatic service providers and end-users. Limited access to quality hydro-climatic information has led to increased exposure and vulnerability of local communities, especially women and children. For example, during climate extremes such as floods and droughts, social exclusion, unequal access to resources, and limited mobility disproportionately affect women (Neumayer and Pluempfer, 2007). The sectors most affected are rural development, agriculture, fisheries, and livestock which drive's the region's economy, as well as other sectors such as health, energy, and insurance that lack adapted services.

Under these conditions, before launching a programme to modernize hydrometeorological services, it is important to understand the needs and perspectives of users and beneficiaries including gender aspects. The modernization will only be effective if it provides practical solutions to the needs of user sectors and populations. The Gender Assessment (Annex 4) shows the gender specificities of each country and highlights the vulnerability of women to climate change. The assessment has identified the needs and gaps, and has informed the gender-based approach to ensure full involvement of all project beneficiaries. This will make NMHSs more visible to decision-makers, who will then be able to finance their activities.

1.4.4 - Challenges related to knowledge of water quality

The demographic pressure on water quality due to diversity and multiple sources of pollution is becoming a major concern. The growing irrigated agriculture in the basin and its proximity to river axes is increasing phytosanitary and nutrients pressure on water resources without the effects being known. There is also pesticides pollution from agriculture, and increasing concentration of nitrates from point source pollution in the southern Lake Chad over the last 20 years due to rapid population growth and increasing human activities (Bello et al., 2019). The oil and mine industry in the Upper Logone basin is also contributing to pollution. The high levels of organic matter is also detrimental to water quality in some places, and causes the proliferation of aquatic plants and plankton, making water treatment more expensive. It also reduces oxygen availability making aquatic life more difficult. High fluoride levels have also been reported in groundwater in Mayo Tsanaga River Basin in the Cameroonian portion of the Lake Chad Basin and Chad formation aquifers in Borno state, Nigeria (Bura et al., 2018).

There is limited and specific knowledge on water quality and almost no information on changes in basic physico-chemical and biological parameter. Water quality analysis laboratories exist in the countries, but the quality of equipment and the level of qualification of the staff (generally low) varies greatly from one country to another.

1.4.5 - Challenges related to food security

The challenges of the climate crisis are numerous and linked strongly to food security. Drought can burn land and destroy crops, while floods can destroy livelihoods and cause grief. This worsens living conditions and fuel social conflicts. For example, in August 2021, inter-ethnic conflicts broke out in the Cameroonian area of Lake Chad Basin between Arabs Choas herders and Mousgoums fishermen related to the fishing canals. The conflict resulted in several deaths (12 to 15 according to sources), numerous injuries, burning 40 villages, and significant internal and cross-border population movements into Chad.

Lake Chad Basin countries, like many African countries, have also suffered from the food price crisis. Agriculture (rainfed and flood recession), livestock, fishing, mineral and vegetable harvesting, and trade in these products are the main pillars of the economy and the means of survival for the population, especially in rural areas. Each year, as the floods and recessions rise and fall, fishermen, herders and farmers move in search of resources. This mobility is one of the main ways the population of the Lake Chad Basin adapts to environmental variability.

The recurrence of droughts affecting the means of production has led some government authorities to build water retention dams (in Cameroon and Nigeria) for irrigated agriculture. These structures, with varying success, have sometimes had other negative effects on ecosystems, such as the drying up of flood plains (Sighomnou et al., 2003), which negatively impacts on flood recession crops and fishing. Moreover, the significant drop in rainfall leads to a large-scale change in the lake level, which raises questions about current farming systems (LCBC, 2015). The frequent return to conditions of Small Chad dry (insufficient flooding to feed the northern basin) compromises all activities in the

northern basin, which contribute to the food insecurity of around 4 million people. Despite the region's enormous agricultural and pastoral potential, climate variability has had a significant negative impact on food availability. Socio-economic factors, such as chronic poverty, high illiteracy rates, and displacement of populations further worsen the food security situation.

Low productivity and high levels of poverty result in limited household access to food, both in terms of own production and the ability to buy food in the market. For example, food crisis (according to [IFPRI](#)), has been particularly severe in two countries in the basin, including the Central African Republic and Chad, which ranked first and third respectively in the 2019 World Hunger Index. Niger, Nigeria and Cameroon ranked 17th, 25th and 42nd respectively out of 117 countries with available data.

Exposed to recurrent climatic hazards such as floods and droughts, agricultural production in the Lake Chad Basin often fails to effectively meet the needs of the population leading to food insecurity, which is a main cause of malnutrition. In particular, the availability of reliable hydrometeorological information in a timely manner is essential for the proper organization/planning of emergency interventions in the form of food aid.

1.5- TARGETED PROJECT AREAS AND BENEFICIARIES

The project intervention area is the hydrologically active Lake Chad Basin, also known as the "new conventional basin", which covers an area of about 1 million km² (**Figure 4**). Climate change and extreme hydrometeorological events affect populations throughout the basin, which is why this project will benefit the entire population by mitigating the risks posed by drought and flood. The lack of hydrological data and information contrasts with the needs and concerns of the riparian states and the international community about the possible disappearance of Lake Chad and increase in extreme events. This was confirmed by clear statements from the main beneficiaries of the project in the countries during the technical consultations carried out for the preparation of this project proposal.



Figure 4. The population of the Lake and its regional environment (Lemoalle et al., 2014).

- Social and civil societal institutions such as schools, hospitals, civil protection, etc.; who will be able to prepare or improve their emergency plans;
- Non-governmental organizations (NGOs), who will use the products and information to improve their resilience and adaptive capacity or transfer them to their partners;
- Community-based organizations, farmers', herders' and fishermen's associations, especially women's groups, who will use the new tools and methodologies to reduce their vulnerability to extreme events, and mitigate/prevent locust and other pests plague;
- Engineering firms and other technical providers, who will be able to develop contingency plans and build more resilient infrastructure;
- People in urban and rural communities, especially young people, who are increasingly familiar with information technology who will receive warning messages and eventually contribute to crowdsourcing;

Ministries, public institutions, research organizations, non-governmental organizations (NGOs) and other national and international organizations have expressed the need for high quality meteorological and hydrological information and services, and have highlighted the high value in developing an information system on the Lake Chad Basin as well as more integrated way of managing floods and droughts. The main sectors for which requests have been identified are:

- The national technical services in charge of hydrometeorological monitoring (NMHSs) are tasked is to produce hydrometeorological information. The project will capacitate them to relaunch monitoring activities, aiming at satisfying the expectations and needs of users and preventing risks;
- The project will capacitate also the Lake Chad Basin Commission whose mandate includes developing information and providing services at the regional level, based on data shared by member countries;
- The services in charge of civil protection, disaster management and food security will benefit from the products and information developed and shared by the NMHSs, including maps of risk areas and alerts in their procedures and crisis management;
- Government authorities in the five countries and related departments such as health, water, irrigation, agriculture and navigation and transport;

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- Environmental conservation stakeholders who manage the important natural heritage of the Lake Chad Basin need a thorough knowledge and regular monitoring of its water resources, which are fundamental for the sustainable management of this ecosystem;
- The other actors of the economic activities such as trade, industries, insurance, research and academics, media etc. They also need hydroclimatic data and information which are fundamental elements for decision making;
- International and regional bodies, humanitarian actors.

As noted in **Figure 4**, the population of the active basin that directly or indirectly benefit from the project is estimated at 47 million inhabitants in 2014. With the population trends, the estimate for 2023 is over 50 million.

PROJECT/PROGRAMME OBJECTIVES:

The project objective is to increase the resilience of the population in the Lake Chad Basin by enhancing the countries capability to manage and adapt to climate-related risks through improvement of hydrological monitoring, data systems and service delivery and awareness on climate-related hazards. Designed on the basis of an approach that integrates all potential beneficiaries, including women and other marginalized groups, the proposed project in Lake Chad Basin also contributes to Goal 6, as well as Goal 13 and 15 of the 17 Sustainable Development Goals (SDGs) adopted by the United Nations Assembly in 2015. In addition to universal and equitable access to safe drinking water, hygiene and sanitation by 2030, this goal also aims at sustainable management of the resource, in terms of water quality, sustainable and efficient use, and protection of ecosystems. It also integrates the notion of transboundary management of the resource, which is essential for sustainable management, but also conducive to peace and cooperation. Under such conditions, proper management requires informed decisions, which must be based on reliable and timely hydrological data and information (**Table 9**). The project goals and activities are related to [WMO's eight long-term ambitions on hydrology](#) and will benefit from the new WMO action plan for hydrology. Project activities will build on existing data and make use of the outcomes of other completed and on-going projects in the region and will make use of technical capabilities of existing WMO programmes and initiatives such as the Global Hydrometry Support Facility ([WMO HydroHub](#)), the Global Hydrological Status and Outlook System ([HydroSOS](#)), WMO Hydrological Observing System ([WHOS](#)), WMO Integrated Global Observing System ([WIGOS](#)), WMO Information System ([WIS](#)), Global Data-Processing and Forecasting System ([GDPFS](#))/WMO Integrated Processing and Prediction System ([WIPPS](#)), and Climate Risk and Early Warning Systems ([CREWS](#)) as well as the project Assessment of Natural Disasters Impacts in Agriculture ([ANADIA](#)), to offer tailored, robust, innovative and sustainable solutions, both for water monitoring and for disaster risk reduction and climate change adaptation. The project will serve the participating countries as a demonstration of an end-to-end solution for service delivery responding to the needs of basin-wide end-users, in order to ensure long-term water monitoring for sustainable environmental and economic development.

As given in **Table 9**, the specific outputs of the project are mainly aimed at (i) building an effective water information system, (ii) improving meteorological and hydrological products and services, (iii) training and informing vulnerable communities on emerging risks, (iv) strengthening the technical and institutional capacities of the national services involved in the project activities (v) dissemination and facilitation of access to relevant products, services and tools for water resources management, and their use for the protection of human lives, livelihoods and the environment from water-related hazards, and (vi) strengthening of regional and global cooperation through improved knowledge management on Lake Chad and its tributaries in order to provide appropriate climatic and hydrometeorological services.

The five-year project aims at combining global, regional, national and local information systems. Specific needs of countries and sub-national entities will be identified in the first phase of the project implementation. A theory of change diagram of the project's contribution to solving the main problems affecting the basin is presented in **Figure 5.1**. [The Components of the proposed project follow the hydrometeorological value chain with specific aspects in each of the elements, as presented in the diagram in Figure 5.2. The first three components relate to the three major elements of the hydrometeorological value chain, namely observation networks \(Component 1\), information systems \(Component 2\) and modeling and forecasting \(Component 3\). While there will be trainings associated with each of these components, institutional strengthening and capacity building, especially in relation to operations and sustainability, are cross-cutting themes and therefore, Component 4 is specific to these aspects. Regarding the services and users, there are two levels that need to be addressed differently. These are:](#)

- [the decision-makers \(Component 5\) that require specific activities related to awareness raising to take critical decisions at real time during extreme hydromet events, as well as decisions required for sustainability of the investments;](#)
- [the user communities \(Component 6\) that require activities that relate to on-the-ground and actual response in the 5 participating countries.](#)

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PROJECT/PROGRAMME COMPONENTS AND FINANCING:

Table 9. Project components and financing (Each of these project components will be executed in each of the considered 5 riparian countries)

Project/Programme Components	Expected Outcomes	Expected Outputs	Countries	Amount (US\$)
Component 1. Improvement of hydrological and meteorological observing system networks	Outcome 1.1. Strengthened institutional capacity to monitor and detect climate related hazards, thereby contributing to reduce socioeconomic and environmental risks and to protect lives and livelihoods	Output 1.1. Hydromet observation network modernized/established Output 1.2. Sustainable funding mechanism for Hydromet monitoring identified	Cameroon, CAR, Chad, Niger and Nigeria	1 812 500
Component 2. Strengthening regional hydrometeorological information systems (database and data sharing mechanism)	Outcome 2.1. Enhanced regional cooperation for improved information systems and services with a seamless approach for use in planning and decision-making	Output 2.1. A tailored regional interoperable database owned and managed by LCBC and NMHSs Output 2.2. Appropriate data sharing agreements in place and agreed data exchanged using appropriate platforms and standards	Cameroon, CAR, Chad, Niger and Nigeria	882 500
Component 3. Identification and development of hydrometeorological products and services	Outcome 3.1. Enabling environment created for understanding and addressing the user needs [associated with Outputs 3.1 and 3.2] Outcome 3.2. Development of products and services for climate-adaptative and responsive planning and development [associated with Outputs 3.3, 3.4 and 3.5]	Output 3.1. A transboundary EWS mechanism designed, based on national needs and transboundary policies, including regional guidance and advisories by LCBC Output 3.2. User needs and requirements understood by NMHSs, public and private sectors Output 3.3. Climate risk assessed and services/products developed for the basin, including for food security and environmental services Output 3.4. Flood and drought forecasting tools and EWS within the riparian countries in place and coordination at regional level improved Output 3.5. A framework for the production and sharing of hydrological status assessments and outlook products in place to inform water resource management	Cameroon, CAR, Chad, Niger and Nigeria	2 542 500
Component 4. Training of project stakeholders and knowledge development	Outcome 4.1. Strengthened institutional and human capacities at regional and national levels to operate and maintain the	Output 4.1. Organizational arrangements at a national and regional levels and development plans prepared and implemented	Cameroon, CAR, Chad, Niger and Nigeria	805 000

	infrastructure and tools made available through the project	Output 4.2. Hydromet staff is trained in monitoring, information systems and service delivery (with gender disaggregation)		
Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services (communication and timely diffusion of appropriate product and services to end users)	<p>Outcome 5.1. Enhanced communication and awareness programmes on Hydromet and early warning systems [associated with Outputs 5.1 and 5.2]</p> <p>Outcome 5.2. Enhanced preparedness and response capability to act upon warning and risk information to minimize impact of hydromet disasters on lives, livelihoods and socio-economic systems [associated with Outputs 5.3 and 5.4]</p>	<p>Output 5.1. Awareness raised for decision makers, lawmakers and water users and strategy for stakeholders' engagement developed (with gender disaggregation)</p> <p>Output 5.2. User feedback mechanism institutionalized through a collaborative framework for continuous dialogue and understanding evolving needs and feedback mechanisms across the value cycle for improvement of hydrological products and services</p> <p>Output 5.3. A communication and warning dissemination system set up, operational and accessible to a wide audience, including vulnerable people (taking into account needs of marginalized groups; Gender disaggregated)</p> <p>Output 5.4. Inclusive warning messages accessed, received, understood and trusted by user communities in the Lake Chad basin (taking into account the needs of marginalized groups; Gender disaggregated)</p>	Cameroon, CAR, Chad, Niger and Nigeria	1 526 500
Component 6. Plans and communities' response capacity	Outcome 6.1. Enhanced governance mechanisms at the basin level and increased adaptive capacity within the agricultural and natural resource sectors as well as disaster risk management	<p>Output 6.1. Plans, policies, strategies for integrated flood and drought management, risk mitigation and climate resilience at regional, basin and national levels</p> <p>Output 6.2. Medium and long-term adaptation and mitigation measures recommended in the pilot vulnerable areas (taking into account Gender, youth and disabled people needs)</p>	Cameroon, CAR, Chad, Niger and Nigeria	1 485 000
7. Project/Programme Execution cost				855 000
8. Total Project/Programme Cost				9 855 000
9. Project/Programme Cycle Management Fee charged by the Implementing Entity				900 000
Amount of Financing Requested				10,755 000,

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PROJECTED CALENDAR:

Project Duration: 5 years (60 months)

The proposed dates for the different stages of the project are presented in the table below:

Table 10. Project Calendar

Milestones	Expected Dates
Start of Project/Programme Implementation	Jul-Dec 2024
Mid-term Review (if planned)	Jul-Aug 2026
Project/Programme Closing	Jun 2029
Terminal Evaluation	Mar-Aug 2031

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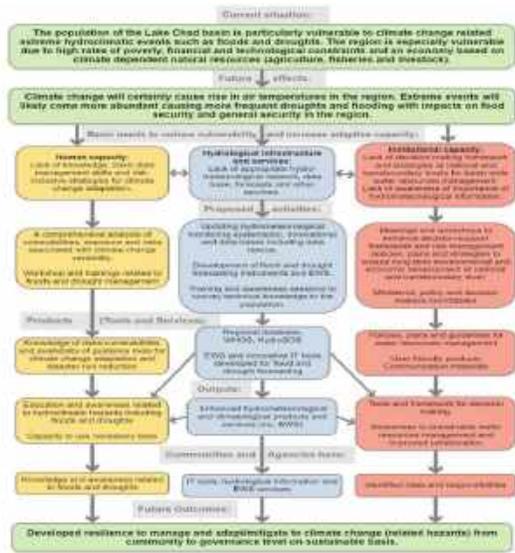


Figure 5.1. Schematic representation of the Lake Chad project framework.

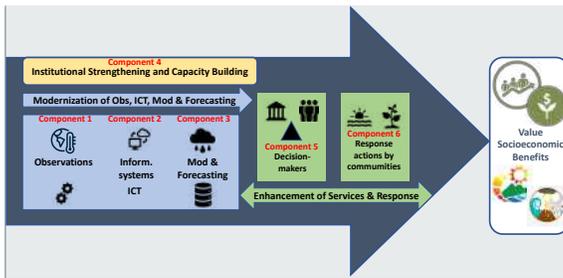


Figure 5.2. Diagram with the Components of the Proposed Project versus the elements of the hydromet value chain.

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PART II: PROJECT/PROGRAMME JUSTIFICATION

A. Describe the project/programme components, particularly focusing on the concrete adaptation activities, how these activities would contribute to climate resilience, and how they would build added value through the regional approach, compared to implementing similar activities in each country individually. For the case of a programme, show how the combination of individual projects would contribute to the overall increase in resilience.

The transboundary dimension of the basin makes the regional approach essential to promote collaboration and exchanges of experience between national partners and with the LCBC, ensuring, inter alia, a global analysis of the impacts of climate change on the entire basin and development of appropriate mitigation measures. The hydrological, social, economic and ecological interdependence in transboundary basins requires greater integration in the development and management of shared resources. Sound management of these resources requires a dynamic interrelationship between basin stakeholders and governments.

Weather, climate, and water know no national borders. Transboundary issues related to political history, socioeconomic conditions, geography, laws, and institutions may exist in the region, but coordination and cooperation among countries on hydrometeorological services is absolutely required and it will also promote peace among neighboring states and communities. In particular, the countries in the in the Lake Chad share the same climate and vulnerable communities within the basin face the same climate-related challenges.

The services provided by NMHSs of countries in the Lake Chad Basin rely on a complex and dynamic system of subsystems—monitoring and observing, modelling, forecasting, service delivery, information and communication technology, research, and quality management— all of which are supported by institutional capacity building, technical training, and outreach to stakeholders and recipients of information. A common desire is to direct investments toward the modernization of all subsystems at the national level, for example by installing comprehensive observing networks and developing the ability to run sophisticated local models. However, these are technological goals rather than activities designed to achieve the expected socioeconomic outcomes that drive the hydromet investment in the first place. In any case, technological constraints are not the only limitations the Lake Chad Basin countries face; they also have limited human and financial resources for carrying out the operation and maintenance of the subsystems. Therefore, integration of the basin's hydromet systems provides opportunities to lower required investment while increasing accuracy of forecasts and reducing false alarms. Observed data from the hydromet monitoring networks needs to be shared among NMHSs and related agencies through regional data exchange mechanisms in order to improve monitoring of hazardous hydromet related conditions, numerical modelling, forecasting and service delivery. The design of optimum regional composites for each of the subsystems—hydromet observational networks, information management, modelling, forecasting, and service delivery that meet the existing and future needs of societies— would ensure robust interoperability, efficiencies, and optimization of infrastructure costs, together with a higher level of harmonization, integration, and complementarity within the region.

Given similar user requirements, a regional dimension to hydromet services and early warning systems would provide a forum (and infrastructure) for sharing data, expertise, and experiences among NMHS and other institutional staff, including on how to deal or liaise with intragovernmental communications, emergency services, the media, etc., to ensure the viability of their decisions to achieve sustainable development and a good dialogue among relevant stakeholders. The regional approach is also a powerful tool for building solidarity, mutual trust and collaboration between the different technical teams in the countries and regional organizations. This practice, which should continue beyond the project lifetime, promotes mutual assistance and peer learning between neighboring NMHSs and other key institutions in carrying out activities related to the knowledge and management of water resources and the EWS in the Lake Chad Basin. Building a pool of experts in the region will support reduction of costs and personnel at the individual countries for operation and maintenance of the systems in the long run. It also strongly supports the exchange of current and historical data and information that underpins transparent decision-making critical to prevent conflicts in competitive use, namely with regard to shared resources of the transboundary basin. The main differences between the regional approach proposed by this project and the national interventions lie in the sharing of selected costs, data and products, and regional approach enables efficient knowledge sharing, transboundary capacity building and peer learning from neighboring countries. It also takes into account sometimes contradictory needs of the populations and water users of the whole basin, and therefore can prevent conflicts between users.

Through AF support, the proposed project will overcome key barriers to increasing the climate change resilience of communities by bridging and front-loading the investment gaps on the hydromet services in the region, including the uptake by communities. To overcome the barriers to provide timely, accurate, reliable, user-friendly and actionable hydromet services, and ensure last-mile connectivity, interventions with the most transformative impact on reducing disaster risk and fostering adaptation to climate change, have been identified based on extensive in-country consultations in the five Lake Chad Basin countries. Issues of insecurity, synergy of action between the hydrological and meteorological services of the participating countries will be considered during project implementation. These

interventions will support the strengthening of NMHSs to produce quality and useful data, products and services, through enhanced regional cooperation, harmonization, and knowledge sharing between the five countries, facilitated by LCBC acting as one of the executing entities for this project. At the same time, there will be interventions supported by GWP as the other executing entity, which are targeted to enhance preparedness and response capability of communities and sectors to act upon warning and risk information to minimize impact of hydromet disasters on lives, livelihoods and socioeconomic systems, and to build up long term resilience.

At regional level, LCBC and its member countries have a regional framework for data collection and sharing, however this framework has not been operationalized and it's not interoperable with national systems. At the same time, at national level, the NMHSs of the five countries in the Lake Chad Basin have limited institutional, financial and technical capacities to monitor, forecast and provide warnings of hydrometeorological hazardous events to inform decision-making processes. According to the technical consultations with the countries, there are limited number of hydromet stations and inappropriate databases and tools for data-processing and forecasting. Institutional weaknesses have also been noted in the NMHSs of the five countries along with limited human resources. There is also limited interactions/collaboration between the NMHSs and the Disaster Risk Management (DRM) institutions in the five countries. As a result, there is limited production and timely dissemination of user-centred hydromet information and services that can help reduce exposure and vulnerability of communities and economic sectors. Throughout the implementation of the proposed project, relationships between NMHSs and national DRM institutions and other stakeholders will be strengthened, along with awareness raising. This is particular important for strengthening regional, basin and national early warning / early action, for strengthening integrated flood and drought management both at basin level and in the countries, and for developing risk mitigation and climate resilience adaptation measures at pilot community level in the five countries, with the creation of favorable conditions for upscaling of community plans to other geographical areas for a nation-wide approach.

Finally, there are limited interactions between the producers and users of hydromet services, and therefore limited feedback mechanisms to ensure the effective production and delivery of relevant, high-quality and accurate hydromet services. The financial resources to overcome these barriers are also not sufficient or not available within the LCBC and its member states, because of their Least Developing Countries (LDC) status and climate change-related threats on their economy, highly dependent on climate-sensitive sectors. In this context, the proposed project will support market surveys in target countries to help establishing and support implementation of a strategy for sustainability of the investments.

The six components of the proposed project are designed to achieve the paradigm shift (**Figure 6**) of improved monitoring and management of hydromet risks in the short-, medium-, and long-term, that will facilitate growth in key climate sensitive target sectors (such as disaster risk management, agriculture, water resource management, etc.), and enable resilience and adaptation to climate change impacts. This project provides an opportunity for countries to leverage each other's strengths, deploy complementary fields of expertise and risk management capacity, and capitalize on successful global, regional and national initiatives, including those promoted by WMO (such as the HydroHub, WIGOS, WHOS, WIS, HydroSOS, etc). The regional scope of this project underpins its success to improve climate risk assessment and promote climate-resilient socio-economic growth in the long-term. The proposed project impact will be achieved through a mutually reinforced integrated approach. **Figure 6** illustrates the linkages among the outcomes of components.

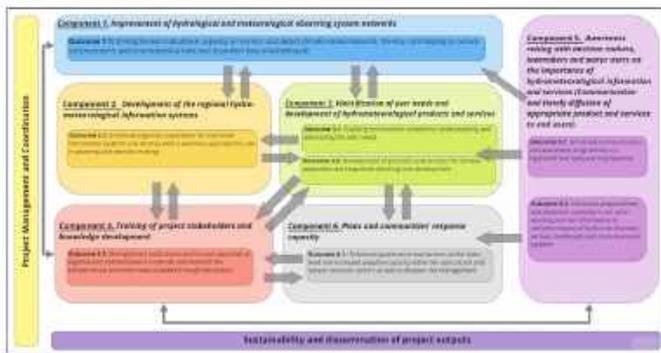


Figure 6. Linkages among the outcomes of components.

Component 1. Improvement of hydrological and meteorological observing system networks

Noting that there is limited institutional capacity to monitor and detect climate related hazards in the five countries of the Lake Chad Basin, due to lack of sustainable operation and maintenance mechanism, Component 1 focus on strengthened institutional capacity to monitor and detect climate related hazards, thereby contributing to reduce socioeconomic and environmental risks and to protect lives and livelihoods (**Outcome 1.1**). According to the [Early Warning for All \(EW4ALL, the UN Global Warning Initiative for the Implementation of Climate Adaptation\)](#) Action Plan for Pillar 2 (Observations and Forecasting) ([WMO, 2023](#)), observations are the fuel that feeds the Early Warning Systems. Supporting the Regional Basic Observing System (RBON) and the Global Basic Observing System (GBON) is an essential step for implementing EW4ALL.

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Hydrological observation networks also suffer significant gaps; based on [WMO Hydrology Survey \(2020\)](#), 2/3 of 100 countries reported that hydrological networks are in decline. In addition, hydrological data is often not exchanged between countries as well as between countries and LCBC, as compared with atmospheric observation data. This poses major challenges for warnings of droughts and floods – two of the most impactful climate hazards for people. [According to the EW4ALL Executive Action Plan 2023-2027](#), around the globe 145 countries share 263 transboundary basins, covering half of Earth’s land surface, making hydrological data sharing an issue of high regional importance. Strengthening and updating an operational and reliable system for collecting, transmitting, processing, and archiving data of water resources in the Lake Chad Basin is of extremely urgency. **Output 1.1** is therefore focused on Hydromet observation network modernized/established. This component will be supported by the WMO HydroHub through the uptake of appropriate innovative technologies and approaches by NMHSs (see Part II, section B. below). Monitoring stations will be designed for multipurpose use and to be benefiting [WMO-WIGOS](#) tools and will be ready for further developments of the Regional Basic Observing Network ([RBON](#)) and the Global Basic Observing Network ([GBON](#)) as appropriate. WMO Congress decision in 2021 on GBON does not include hydrological variables yet (except for precipitation and soil moisture); however, new stations and related data will be integrated into WIGOS and WIS, and having all observing stations into WIGOS will allow the integration of key hydrological stations into GBON whenever it is ready/appropriate. In addition, the Regional Association I (Africa) (February 2023) stressed the need to promote regional cooperation and exchange of data across boundaries and facilitate the process of GBON data and the use of global and regional infrastructure (e.g. WIGOS, WIS centres). In addition, WIGOS National implementation plans would be considered/developed, and hydrological stations would be registered in the OSCAR surface database. Major activities as part of **Output 1.1** include:

- **Activity 1.1.1** – Carry out a detailed analysis of the Hydromet monitoring system (including weather, surface water, groundwater and water quality), and propose possible upgrades of the existing equipment aiming for state-of-the-art data collection e.g. through the use of the Global Hydrometry Support Facility (WMO HydroHub) Innovations Calls. This activity also includes: (a) the development an inventory of the available station equipment (including transmission techniques) and determination of the complementary equipment to be acquired (by adopting innovative technologies), including specifications and tenders for the five countries of the basin; and (b) carrying out a network optimization study to propose the pilot sites and the priority stations to reinstall, recover and/or acquire (as appropriate) and specify the equipment for each station as well as the list of works and actions to be undertaken.
- **Activity 1.1.2** – Rehabilitate and upgrade old stations and install new stations, including training in operation and maintenance of the stations.
- **Activity 1.1.3** – Document and strengthen collaboration and synergies with other projects developing different monitoring methods for the local conditions (remote sensing, AI, crowdsourcing), in order to develop a catalogue of innovative methods and techniques implemented in other countries or in similar conditions that could be applied in the Lake Chad basin and explore their implementation at the regional level.

One of the main bottlenecks of hydromet modernization is the sustainability of the investments due to the limited capacity of the countries to operate and maintain their observational infrastructure. In 2019, recognizing this challenge, the [Alliance for Hydromet Development](#) was established to bring together major international development, humanitarian and climate finance institutions (including the AF), collectively committed to scale up and unite efforts to close the hydromet capacity gap by 2030. It aims to increase the effectiveness and sustainability of hydromet investments by forging a collaborative partnership which recognizes and leverages the respective competencies and expertise of its members. One of its priorities is the [Systematic Observations Financing Facility \(SOFF\)](#), which is the dedicated funding mechanism for the implementation of GBON. At this stage, Chad ~~was~~ approved as part of SOFF supported countries ~~in 2022, and Niger in 2023~~. ~~SOFF focuses only on stations registered as GBON (WMO Global Basic Observing Network), i.e., exclusively meteorological observing stations as per WMO Congress decision (surface and upper-air radio-sounding) and, as of today, the extension of SOFF to hydrological stations is under exploration (and potential implementation starting would be likely beyond this project timeline); however, meteorological stations (especially precipitation) will contribute to early warning systems in the Lake Chad Basin. Investments under this proposed project for these countries will focus on the acquisition, installation, and provision of related services associated~~

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with hydrological stations, to be complementary to SOFF support. In addition, both Chad and Niger have been selected as part of the 30 initial countries for the Early Warning for All (EW4All) coordinated assistance. Through **Output 1.2**, this, and other sustainable funding mechanisms for Hydromet monitoring will be identified in order to support operation and maintenance of the systems in all five countries in the Lake Chad Basin. Major activities as part of **Output 1.2** include:

- **Activity 1.2.1** – Carry out an analysis of the organizational and institutional frameworks of the NMHSs, including the existing legal basis, funding and partnership arrangements, and propose a strategy for sustainable management (operation and maintenance) of monitoring networks.
- **Activity 1.2.2** – Identify and recommend different financing models of the NMHSs – including involving private sector and stakeholders - to build value chains for hydrological and meteorological information.

Component 2. Strengthening regional hydrometeorological information system (database and data sharing mechanism)

Data being generated and collected through Component 1 will be collected and managed in a timely manner to meet the different needs of users throughout the Lake Chad Basin. As indicated above, regional cooperation and exchange of data across boundaries need to be promoted. Even though there is the Lake Chad Information System (LIS, database and data sharing mechanism) in place for the dissemination and sharing of information; their operation is limited due to lack of connection and interoperability with national databases, processes for automatic transfer of data from national to regional databases, and of quality assurance/quality control (QA/QC). Through **Component 2**, data exchange will be facilitated through existing tools in the region, notably the LCBC Water Charter, and promoting the implementation of **WHOS** that supports hydrological data exchange linking heterogeneous hydrological data sources and multiple users making the data more harmonized, discoverable, interoperable, and accessible through the global, regional and national infrastructures. **Outcome 2.1** will ensure enhanced regional cooperation for improved information systems and services with a seamless approach for use in planning and decision-making. A tailored regional interoperable database owned and managed by LCBC and NMHSs will be established (**Output 2.1**) through the implementation of the following activities:

- **Activity 2.1.1** – Perform Quality Assessment and Quality Control of historical data of the stations of the project monitoring network in terms of availability, quality, gaps, completeness, form/format in both the national and regional databases, transfer/update of any missing data to the regional database from both ground and satellite-based data (at regional level).
- **Activity 2.1.2** – Update/define and institute procedures and routines for data acquisition, quality control, and archiving at the LCBC and in the NMHSs of the five participating countries [taking into account the assessment done under Output 4.1] (both at regional and national levels).
- **Activity 2.1.3** – Upgrade the IT infrastructure (hardware and software, including cloud services) to support the operation and transfer of the data from national to regional database (at both regional and national levels).
- **Activity 2.1.4** – Develop/strengthen a regional database management system according to WMO guidelines to meet the needs of all users, including graphical visualization of main observed variables in real time at the key stations of the network (at regional level).

National and international standards must be met in order to ensure that data can be comparable and used simultaneously. Therefore, through **Output 2.2**, appropriate data sharing agreements will be in place and agreed data exchanged using appropriate platforms and standards. This will be implemented through the following activities:

- **Activity 2.2.1** – Define data exchange mechanisms and procedures; update existing procedures (as required), in relation to new and innovative data and information exchange methods taking into account existing WMO data exchange and metadata registration tools (WIGOS, WIS2.0, WHOS, OSCAR)
- **Activity 2.2.2** – Develop/update data sharing protocols according to WMO unified data policy taking into account the relevant agreements developed by LCBC and signed by the 5 countries, including the Water Charter that outlines the responsibilities for operation and maintenance of the regional database management system
- **Activity 2.2.3** – Develop an inventory of existing data and metadata publication tools, web services, data formats, data and metadata standards, and vocabularies within LCBC and Member States (to complement ongoing activities in LCBC's projects such as the Knowledge Management Platform from PROLAC project)

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- **Activity 2.2.4** – Implement free (and open source) data exchange tools and web services supported by WMO and conducting capacity development (to complement ongoing activities in LCBC's projects such as the Knowledge Management Platform from PROLAC project)

Component 3. Identification and development of hydrometeorological products and services

This component focuses on the development of products taking into account different needs and opportunities due to e.g. gender and age, to best reach different social categories and reduce inequalities. Activities under this component will allow facing climate hazards and promoting better resilience to climate change. The products and services developed will be adjusted to the needs of end users to enable timely decision-making and ensure the sustainability of project achievements, at both national and regional levels.

The consultations under Component 3 to identify the type of services related to climate impact and based on sector vulnerability and the willingness-to-pay for a product or service would be guided by the framework/methodology for community engagement and consultations planned under Outputs 3.1, 5.2, 6.2 and 6.2 of the project proposal. To ensure no group or persons are left behind, the methodology of Focus Group Discussions (FGDs) would be adopted for consultations in selected project communities which will include sector, gender, and vulnerability considerations. The output would guide policy makers and particularly the National Meteorological and Hydrological Services and Civil Protection/Security Agencies towards prioritization of early warning investments for various sectors and vulnerable groups including the estimated cost requirements of delivering products and services to sectors, vulnerable groups, and community dwellers.

Through **Outcome 3.1**, the environment will be created to enable understanding and addressing the user needs. First, this will be done through a number of activities that will allow the design of a transboundary EWS mechanism, based on national needs and transboundary policies, including regional guidance and advisories by LCBC (**Output 3.1**), as follows:

- **Activity 3.1.1** – Launch regional consultations to gather information and make recommendation on: (a) the effective coordination between national and transboundary policies in the context of flood and drought management and climate adaptation; and (b) the information and dissemination modes [regional consultations should be done after the national consultations in 6.1.1].
- **Activity 3.1.2** – Launch national consultations in the five countries to gather information and make recommendations on the types of information and modes of dissemination to the populations (taking into account gender distinctions and their different social roles), including the most vulnerable.
- **Activity 3.1.3** – Collect feedback and make recommendations on the needs for interconnection with transboundary policies and present recommendations to policy makers in the five participating countries [in articulation with 6.1].
- **Activity 3.1.4** – Revise, update, develop and document process and protocols to monitor flood and drought in local pilot areas, at national and regional scale, as well as to act and make coordinated decisions on the development of alerts, dissemination methods, and response mechanisms.
- **Activity 3.1.5** – Design a transboundary EWS mechanism, including regional guidance and advisories by LCBC, taking into account a community-based approach, as well as the national needs and transboundary policies gathered under Activities 3.1.1 to 3.1.2 [implementation is under Component 5].

WMO initiatives such as the Global Hydrometry Support Facility (WMO HydroHub), which focuses on improving NMHSs hydrological monitoring for effective delivery of hydrological services, should be leveraged. For example, the WMO HydroHub Use-Provider workshops and/or webinars can be used to foster the dialogue between users and providers of hydromet services. As part of these activities, user needs and requirements will be gathered in order to help establishing a common understanding among NMHSs, public and private sectors (**Output 3.2**). In order to achieve this result, the following activities will be implemented:

- **Activity 3.2.1** – Organize WMO HydroHub User-provider Workshops (involving NMHSs, public and private sectors) at regional level and make detailed analysis of the diverse user groups and associated needs.
- **Activity 3.2.2** – Produce a compilation of the respective needs and requirements from the exchanges to improve the performance of NMHSs and explore new markets for NMHSs' services.
- **Activity 3.2.3** – Evaluate entry points for participation of different user groups as identified from their capacities, responsibilities, habits for example through partnerships for data collection and sharing, updating or setting up of monitoring networks and user feedback on monitoring and EWS services in terms of quality and

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- **Activity 3.2.4** – Collectively (providers and users) define recommendations for cooperation and active communication to ensure that services are continuously tailored and improved.

Through **Outcome 3.2**, products and services will be developed for climate-adaptative and responsive planning and development. Climate risk will be assessed, and services/products will be developed for the basin, including for food security and environmental services (**Output 3.3**).

- **Activity 3.3.1** – Conduct a detailed Climate Risk Assessment of the Lake Chad Basin, including field studies, to identify vulnerability and exposure to risk factors; and create climate risk registers and catalogs disaggregating data by gender and age categories.
- **Activity 3.3.2** – Training on the use and assessment of global and regional numerical weather prediction model outputs (such as quantitative precipitation forecasts), as well as sub-seasonal to seasonal meteorological forecasts, for the Lake Chad basin to help in estimating runoff/streamflow in sub-seasonal to seasonal (S2S) scale (feeding into HydroSOS products), and also forecast floods and droughts in the Lake Chad basin in order to improve the LCBC planning.
- **Activity 3.3.3** – Disseminate information among stakeholders and assess the impacts of climate change and future risks in different sectors (including for food security and environmental services) and to gather feedback for improving products and services.
- **Activity 3.3.4** – Conduct a willingness-to-pay (WTP) survey among stakeholders to gather feedback on most preferred climate-related products and services which could be paid for by policy makers and community dwellers as part of sustainability considerations for disaster risk reduction (DRR) and food security [associated with 3.3.3, 5.2.1, 5.2.2, 6.1.2, 6.2.2].

The WTP survey is targeted to users of water information such as dam (hydroelectric and hydroagricultural) and waterway managers, water supply utilities, etc. It's not aimed at the Basin's vulnerable communities.

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The Lake Chad basin is vulnerable to the effects of violent hydroclimatic phenomena, including floods (both fluvial and flash), heatwaves, droughts and sandstorms, but forecasting tools and EWS within the riparian countries and coordination at regional level are yet to be improved. Through **Output 3.4**, flood and drought forecasting tools and EWS within the riparian countries will be put in place and coordination at regional level will be improved. This will be done under the following activities:

- **Activity 3.4.1** – Carry out a detailed analysis of hydrological forecasting tools and EWS (related to floods and droughts) within the participating countries and at the regional level, with a view of determining possible upgrades of the existing systems and mechanisms for a state-of-the-art (impact-based) EWS.
- **Activity 3.4.2** – Structure the processes to scale up the use of meteorological and hydrological observation and monitoring methods based on remote sensors (e.g. satellite altimetry, Raincell) applied in Chad, and analyze the feasibility of such methods in pilot areas of Lake Chad [in articulation with 1.1.3]
- **Activity 3.4.3** – Undertake extreme value analysis for the determination of flood and drought risk thresholds for the various hazard-prone areas of the Lake Chad basin, as well as thresholds based on historical events in consultation with technical services and local representatives.
- **Activity 3.4.4** – Develop a flow forecasting information system for the Lake Chad basin taking into account various available and existing models, and establish a framework for comparison and analysis of information adapted to forecasters and operators.

HydroSOS (Hydrological Status and Outlook System) is a WMO initiative that strengthens countries' capacities to monitor the status of water resources and produce seasonal outlooks, allowing stakeholders at the national level to assess and allocate their water resources. It allows, for example, farmers to know which crop to plant and when, as well as when to water. HydroSOS has entered its implementation phase and there is an opportunity to be implemented in Lake Chad Basin. Through **Output 3.5**, a framework for the production and sharing of hydrological status assessments and outlook products will be in place to inform water resource management. Major activities under this Output include:

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- **Activity 3.5.1** – Apply the Global Hydrological Status and Outlook System (HydroSOS) concept, standards and tools, explore the improvement and the development of products based on available Hydromet data (in situ and remotely sensing data), if available local models and downscaling of global models to provide a comprehensive

overview of the state of the basin's water resources as well as the hydrological outlook for the coming weeks and months (seasonal to sub-seasonal time scales).

- **Activity 3.5.2** – Update/set up a web portal to disseminate the Lake Chad basin related HydroSOS products (at country and regional level and to the HydroSOS global portal) [linked with the Lake Chad Information System (LIS)].
- **Activity 3.5.3** – Sensitize and train NMHSs, national and regional institutions and research centers on the different uses of Lake Chad Basin water resources information. Produce easy-to-digest (or understandable) bulletins (as outputs of HydroSOS portals) for hydrological status and outlooks based on the user requirements, to assist users and policy makers in decision making.

Component 4. Training of project stakeholders and knowledge development

Capacity building is a critical component of any project. It helps to ensure full ownership of new generation Hydromet tools and equipment by the various actors, and contributes to sustainability of the investments. It will also integrate organizational and financial aspects putting a focus on the training of female and young professionals. **Outcome 4.1** focus on strengthening institutional and human capacities at regional and national levels to operate and maintain the infrastructure and tools made available through the project. This component encompasses two major Outputs: (a) Organizational arrangements at a national and regional levels and development plans prepared and implemented (**Output 4.1**), whose activities are:

- **Activity 4.1.1** – Undertake an assessment of existing operating procedures and human resources capacities for Hydromet monitoring and data management making use of the WMO HydroHub Capacity and Needs Assessment; and in collaboration with all relevant stakeholders, develop recommendations and a proposal for an organizational reform strategy with an action plan to enhance institutional arrangements in the five countries of the Lake Chad basin.
- **Activity 4.1.2** – Develop a needs-based training programme and action plan for staff from national and regional institutions and deliver tailored training for the development of project activities.

and (b) Hydromet staff is trained in monitoring, information systems and service delivery (with gender disaggregation) (Output 4.2), whose activities are:

- **Activity 4.2.2** – Train/reskill LCBC and NHMSs' staff in data transmission, management, exchange, information dissemination, and information systems made available, including improvement/development of hydrological information products and mechanisms for data and metadata interoperability in LCBC and NMHSs.
- **Activity 4.2.3** – Train monitoring station observers in the operation and maintenance of new generation hydrometeorological equipment, prevention of vandalism and in the importance of sustaining observations.

The capacity building activities under Output 4.2 will include ongoing and certified training of national experts, as well as relevant missions, and specific trainings, as appropriate and defined under Output 4.1.

Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services (Communication and timely diffusion of appropriate product and services to end users)

Awareness raising, stakeholder engagement and diffusion of products and services to end users in a way where they can act upon the information received are important components of the adaptation process to manage the impacts of climate change, enhance adaptive capacity, and reduce overall vulnerability.

A deliberate approach and mechanisms to ensure stakeholders engagement, with particular attention to involvement of end users and to gender and inclusion concerns, are important to ensure that the project responds to stakeholders concerns and needs, is relevant, generates enthusiasm and support, and that chances of success are maximized. Special attention should also be placed on raising political awareness as policy makers and politicians are key actors in the policy process of adaptation and in sustaining changes made. Through **Outcome 5.1**, stakeholder engagement approaches and awareness programmes on Hydromet and early warning systems will be enhanced. In particular, awareness will be raised for decision makers, lawmakers and water users and strategy for stakeholders' engagement developed (with gender disaggregation) (**Output 5.1**), through the following activities:

- **Activity 5.1.1** – Organize awareness-raising activities for decision-makers, legislators and water users, including through the WMO HydroHub Ministerial Roundtables. Dialogues organized in the last year of the project's development should, as far as possible, use the benefits of the project's activities as an illustration (showcase cost-benefits and added value of Hydromet services).
- **Activity 5.1.2** – Develop a gender-responsive stakeholder engagement strategy and action plan for continuous engagements with key stakeholders, including Civil Society Organizations (CSOs), private sector, government departments and local community representatives.
- **Activity 5.1.3** – Implement the stakeholder engagement strategy and action plan (developed under Activity 5.1.2) and support institutionalization of the process to ensure continued engagement beyond project implementation.

Feedback mechanisms are critical to inform iterative service development and delivery plans. The following activities will be implemented to support the institutionalization of user feedback mechanism through a collaborative framework for continuous dialogue and understanding evolving needs and feedback mechanisms across the value cycle for improvement of hydrological products and services (**Output 5.2**):

- **Activity 5.2.1** – In close co-operation with users, develop appropriate user feedback mechanisms and identify novel and user-friendly channels that allow continuous feedback and engagement from all users of hydrometeorological services.
- **Activity 5.2.2** – Implement and support the institutionalization of the user feedback mechanisms to ensure continued improvement of hydrometeorological products and services.

Aligned with the [FW4ALL Action Plan for Pillar 3](#), **Outcome 5.2** will contribute to enhanced preparedness and response capability to act upon warning and risk information to minimize impact of hydromet disasters on lives, livelihoods and socio-economic systems.

The fundamental purpose of an EWS is to ensure people receive warnings in advance of impending hazardous events, so that they can take the necessary actions to save lives, livelihoods and to support longer-term resilience. Effective early warning services are co-designed with the 'clients' they serve and have feedback mechanisms to help ensure messages reach people through preferred and trusted communication channels, in actionable formats and in a timely manner to support decision making. This co-design process duly recognizes and seeks to address the structural inequalities too often facing women, youth, children, disabled, displaced, Indigenous Peoples and marginalized ethnic groups in receiving, understanding and acting on early warning services. Through **Output 5.3**, the project will ensure that a communication and warning dissemination system will be set up, operationalized and accessible to a wide audience, including vulnerable people (taking into account needs of marginalized groups; Gender disaggregated), and accompanying contingency planning developed. In order to achieve this goal, the following activities will be implemented:

- **Activity 5.3.1** – Following the design prepared under Component 3, implement at LCBC a hydro-meteorological information system that would provide regional guidance and advisories based on data regularly received at regional level from the stations to updating the regional database.
- **Activity 5.3.2** – Develop learning and communication materials (including in local languages) for practitioners, policy makers, parliamentarians, women and youth, including videos, websites, brochures, radio announcements etc, in collaboration with national agencies.
- **Activity 5.3.3** – Organize upscaling of contingency planning at community level, building on the experience in the pilot communities [in articulation with 6.1].

Output 5.4 will ensure that inclusive warning messages are accessed, received, understood and trusted by user communities in the Lake Chad basin (taking into account the needs of marginalized groups; Gender disaggregated). Activities include:

- **Activity 5.4.1** – Engage communities to develop, test and evaluate last-mile arrangements to ensure that warnings and advisories are understandable and actionable for the most vulnerable populations (including women, children and the elderly).
- **Activity 5.4.2** – Organize the development of community contingency plans that are inclusive and gender responsive in pilot communities and support to bring them into service.

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- **Activity 5.4.3** – Organize meetings and training sessions for the population in the pilot sites in the five countries on the interpretation of information disseminated through official channels that are part of the inclusive early warning system (designed under Component 3), ensuring equal participation of men and women, and share lesson learned.

Component 6. Plans and communities' response capacity

Enhancing the enabling environment and building up adaptation capacity of communities are important to ensure resilience to climate risks over the medium to long term. The proposed project will therefore support enhancing governance mechanisms at the basin level and increasing adaptive capacity within the agricultural and natural resource sectors as well as disaster risk management (**Outcome 6.1**). In particular, the project will support the development and contribute to the institutionalization of plans, policies, strategies for integrated flood and drought management, risk mitigation and climate resilience at regional, basin and national levels (**Output 6.1**) through the implementation of the following activities:

- **Activity 6.1.1** – Organize and conduct national workshops to identify gaps and needs in policies and plans, and to highlight and make recommendations for key long-term strategies for integrated flood and drought management.
- **Activity 6.1.2** – Based on the detailed Climate Risk Assessment developed in 3.1.1, and in conjunction with the relevant stakeholders, develop a gender-responsive basin-level drought management plan and flood management plan.
- **Activity 6.1.3** – Support the institutionalization of the flood and drought management plans in major institutions in the Lake Chad Basin.
- **Activity 6.1.4** – Organize and conduct workshops (at least one per country) on the Training Manual for Gender Mainstreaming in Flood and Drought Risk Forecasting and Management with participants from NMHSs, local decision makers, civil authorities, women and community organizations, etc.
- **Activity 6.1.5** – Develop policy briefs and support integration of flood and drought management and climate resilience in policies, plans, strategies, and laws.

To support community level resilience, medium and long-term adaptation and mitigation measures will be recommended in the pilot vulnerable areas (taking into account Gender, youth and disabled people needs) (**Output 6.2**) through the implementation of the following activities:

- **Activity 6.2.1** – Develop a national roadmap or action plan for the establishment of community-led risk mitigation and climate resilience plans, including the selection of priority catchments/communities including gender, youth and other social criteria as critical to determine vulnerability for pilot implementation under this proposed project.
- **Activity 6.2.2** – Cost potential community level risk mitigation and climate resilience measures in the Lake Chad Basin and identify potential sustainable financing strategies.
- **Activity 6.2.3** – In priority selected catchments, develop and implement community-led and gender responsive risk mitigation and climate resilience plans.

B. Describe how the project/programme would promote new and innovative solutions to climate change adaptation, such as new approaches, technologies and mechanisms.

The above-described main areas will be supported by innovative solutions, and especially using WMO HydroHub Innovation Calls to promote their uptake by NMHSs. The innovative solutions that will be leveraged in the project would be either new or have already been through proof-of-concept testing such as those implemented in the context of the WMO HydroHub:

- (i) [Open-source non-contact river flow observations with cameras for Africa](#);
- (ii) [Inexpensive open source dataloggers and sensors for water levels and hydrological measurements in least developed countries](#);
- (iii) [Lidar-based non-contact hydrometry for Mountainous Terrain](#);
- (iv) [Development of a rainfall and stream water level quality control subsystem for Belize climate data management systems \(CDMS\)](#).

But there is a need for further assistance to, for example: (1) tailor them to the needs of hydromet services in the Lake Chad basin countries, (2) build the support infrastructure (e.g., local manufacturers and maintenance providers that would contribute to reduction of operation and maintenance costs), and/or (3) help operational services transition to the new technology.

At the same time, the proposed project will take an innovative approach of combining activities to strengthen EWS with the establishment of governance mechanisms and medium to long term resilience, bridging the community to basin level.

The project parts related to the update of the operational data collection, processing and archiving system will also benefit from the feedback and lessons learned from previous [WMO WHYCOS](#) projects, and from activities implemented by the WMO HydroHub. The stations will be designed to comply with the requirements of the WMO Integrated Global Observing System (WIGOS) and, where appropriate, the Global Basic Observing Network (GBON). WMO Hydrological Observing System (WHOS) will be implemented for data exchange mechanism. The WMO HydroHub will support the uptake of innovative hydrometric technologies as appropriate, complementing standard measurements, and new partnerships with various sectors to take advantage of emerging regional opportunities, with a view to identify the best solutions to the issue of sustainable hydrometeorological monitoring. As regards the equipment to be acquired under the project, priority will be given to robust, low-cost, scalable, and sustainable technologies that can adequately meet the needs of users while ensuring sufficient data quality.

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Feedback from other projects developing data collection has also shown that the sustainability of results depends on factors ranging from the project set-up to the development of products adapted to needs, including the development of activities in the field. Foremost is the response to the needs and requirements of the countries and end-users of hydroclimatic products and services. This aspect must be taken care of this present project as well. It is essential to know the needs of all stakeholders and users covering different sectors, including economic and political decision-makers. The concern to provide high quality products is also an excellent stimulus for improving quality management within the NMHSs. Furthermore, the recent progress in the field of new information and communication technologies (NICTs), enables providing timely information to users via the Internet or Smartphone. Additionally, potential citizen science information and observations, will also increase the visibility of the work of NMHSs. This component will also benefit from new technology innovations, like the [SWOT](#) programme developed to use satellite altimetry for hydrological monitoring and [IRD's RainCell project](#) that uses mobile phone signal attenuation to measure rainfall.

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The stakeholder workshop, organized in N'Djamena, Chad, in February 2022, showed that stakeholders in the lake Chad basin are aware enough of added value from Hydromet services. Therefore, organizing information and awareness workshops will be essential. The full satisfaction of users' needs within the framework of the project will contribute to stimulate their participation in the financing of hydroclimatic monitoring and consequently to the sustainability of the project's achievements for a better control of the parameters in view of resilience to the impacts of climate change.

In addition to field measurement data, satellite climate data (as well as climate scenario data), are also freely available and their use is of particular interest for identifying, locating, estimating impacts and providing risk assessments of floods and droughts, especially over transboundary basins. Applications are also available that can be used to derive even crop yield estimates. These data are freely available to all, but treatment is required to put them into usable formats. This project will identify the best available data for the Lake Chad Basin and train NMHSs and LCBC staff in their use. A good internet connection is however essential.

The capacity building parts of the project. One of the main innovations compared to previous projects is the consideration of institutional aspects. A detailed assessment of the institutional, legal, and budgetary situation will be carried out in the framework of the present project and, where appropriate, proposals for improvement and increased efficiency will be made. Particular attention will be paid to the following aspects:

1. Legal basis

- National and international legislation establishing NMHSs and their mandates/goals, missions and organization;
- National and international legislation on hydroclimatic data and information exchange;
- Proposals for improvements if required.

2. Organization of NMHSs

- Analysis of the current organization and relations between NHSs and NMHSs;
- Analysis of the relationships between the NMHSs and their partners, including the LCBC and other basin organizations of interest to the participating countries;
- Analysis of the relationships between NMHSs and the users of their products and services (e.g., farmers, fishers, environment, energy, civil protection, etc.);
- Proposals for improvements if required.

3. National budgets

- Analysis of the current situation of the NMHSs' budgets;

- Elaboration of a business case based on the direct and indirect socio-economic benefits of hydroclimatic services;
- Proposals for financial and budgetary plans.

Regarding training, one of the main innovations will be the awareness raising of users on the added value that hydromet services can bring to their activities. The lack of trained hydrological technicians in operational hydrology is also a common problem in the five countries in the project. Reflections will be undertaken within the project proposing a long-term sustainable solution to this fundamental issue, including an equitable gender and age distribution integration.

The training will also include a component on the re-training of field observers. These are people who very often belong to vulnerable groups within the communities, who generally live near the hydrometric station, and who are recruited on a voluntary basis for looking over equipment and collecting data at the monitoring station. These observers are generally not employed but receive a small fee for a daily short time they spend observing. Their work is nonetheless fundamental for the knowledge and control of hydromet variables. They will be also used for promoting importance of observations in the community and therefore prevent monitoring systems from vandalism. With the development of monitoring equipment, their daily work is becoming more complex nowadays, and comprehensive training including data transmission and quality aspects is needed.

In addition to the constituent elements of a hydrometric station, the training of observers will focus on a reminder of the essential principles of hydroclimatology, the mode of operation, maintenance and preservation of the equipment. Principles of data storage and transmission to NMHSs should also be addressed.

The knowledge of stakeholders will also be enhanced through capacity building at national and local level to ensure a better adoption of the innovative solutions proposed in the project. The training is aimed to local and national authorities as well as communities, taking into account gender issues. Training will develop knowledge and skills in early warning systems for flood and drought management, hydrological situation and outlooks, community-based flood and drought management, gender mainstreaming. Mobile seminars for transhumant herders and for farmers (on agro-meteorology) are also planned. These trainings will be based on materials already tested and made available by WMO in the framework such as the Flood Forecasting Initiative (FFI), Associated Programme for Flood Management (APFM) or the Integrated Drought Management Programme (IDMP). All trainings in the project will benefit from capacity development programs within WMO activities. Special focus on training will be given for young professionals and females. Field experiences to learn from other countries; new staffs will learn from the trained staffs.

Workshops to build the capacity of NMHSs officers to generate and deliver climate information and forecast products and services, by developing the skills required to access forecasts and data from the Global Producing Centres for Long-Range Forecasts (GPCLRF) will be arranged. Further information on this topic can be found in the WMO-No. 100 – Guide to Climatological Practices (WMO, 2018).

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The knowledge product development and dissemination parts of the project. The hydromet products and services to be expected from the project fall into two categories:

- basic products, including mapping of vulnerable areas (floods and droughts), warnings of potential risk events, to be published regularly on the LCBC and NMHSs websites, on maps, in monthly bulletins and/or yearbooks. This includes information on the state of the basin's water resources as well as the hydrological outlook for the coming weeks and months from WMO HydroSOS. This also includes the information provided by EWS. Indeed, the implementation of a cross-border EWS will be one of the strong points of the project. It will, for example, enable alerts to be provided to downstream countries, based on the situation in the upstream country, as opposed to an approach based only on national data. Knowledge of the global streamflow situation will also help improve not only the governance of water resources, but also that of the basin's associated natural resources in order to preserve the productive potential of Lake Chad. For example, it will enable transhumant herders to better organize their migration across the basin in search of better pasturages;
- special products to be provided at request of the users, and made available via any appropriate means of communication they wish. A survey of potential users of this second category of products is essential to define/precise the nature, form, timing of provision of products, and taking into account gender differences.

The integrated flood and drought early warning system will provide relevant and timely information. It will be designed on the basis of a timely value chain, which will allow the collection and transmission of local, accurate and timely data to users. It should be remembered that the processes of elaboration of the alerts will be different according to the characteristics of the hazard (flood or drought). Indeed, the two extreme hydrological phenomena differ in their spatial and temporal distribution. Floods are relatively rapid events, caused by heavy precipitation, limited in time and affecting relatively localized areas (compared to drought). Drought, on the other hand, is a slower-onset event, with an impact that is generally much more distributed in space and time. The data needed to describe the two phenomena are not identical, although they can be partly shared, such as meteorological, hydrological and agronomic parameters on the

one hand; the methodology used to forecast the two phenomena varies considerably and depends on the availability of different types of meteorological forecasts (from nowcasting for short rainfall events to seasonal and sub-seasonal forecasts for the onset of drought), on the other hand. Hydrological and agronomic forecasts will be produced by a range of methods, from simple graphs using indicators (e.g., water level in the river, rainfall-river flow relationships, etc.) to more elaborate modelling. In short, the main aim is to be able to link hydrometeorological risks to their consequences in vulnerable areas from a social and environmental point of view. From this point of view, the maps of flood and drought risk areas constitute a major contribution that must be constructed and made available to communities throughout the Lake Chad basin. It will be necessary to distinguish between beneficial/wanted floods in floodplains and those that cause loss of property and life.

The products developed will be coordinated with those of the Regional Climate Outlook Forum (RCOF) for Sudano-Sahelian Africa (PRESASS) and Central Africa (PRESAC), organized by the African Centre of Meteorological Applications for Development (ACMAD) in Niamey, Niger, which covers all the countries bordering the Lake Chad Basin. These Fora bring together climate experts and sector representatives from countries in a climatologically homogenous region to provide consensus-based climate prediction and information, with significant input from global and regional producing centres and NMHSs, with the aim of gaining substantial socio-economic benefits in climate sensitive sectors.

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As for information dissemination channels, in addition to the LCBC and NMHSs websites, depending on the nature of the information to be disseminated, public and private media as well as scientific journals are other means of dissemination. Furthermore, due to the development of mobile technology in the countries, the possibility of disseminating information through these means (including in local languages) will also be studied to reach the maximum number of people, particularly vulnerable communities. The possibility of providing a wider range of products on web pages or on Smartphone, will increase the visibility of NMHSs which will then be more likely financially supported. In this respect, the project will benefit from involving groups of women in the dissemination of information (e.g., community radio, direct information, videos via social networks using new technologies).

C. Describe how the project/programme would provide economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project/programme would avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.

The population of the basin lives mainly in rural areas and includes vulnerable groups with a subsistence economy. The main activities that sustain the regional economy in the Lake Chad Basin are rain-fed agriculture, livestock and fisheries. The development of these activities is governed by the nature of the annual rainfall and the location of the resulting resources in the basin. Each year, with the rhythm of flooding and receding water, fishermen move in search of fish, herders in search of pasture and farmers in search of the best receding land. In wet years, migratory pressure on the lake and floodplains of the Logone-Chari system is relatively low. However, during periods of drought, which make both rainfed agriculture and pastoral livestock farming more precarious, the resources of the lake and floodplains become very attractive. This mobility of people in response to the mobility of resources, the multifunctionality of the space (fishermen, farmers and herders sharing the same wetland) leads to tensions/conflicts that result in social exclusion, especially of young people, women and the poorest who are excluded from the best land. **Table 11** summarizes the social, economic and environmental co-benefits of the project per component.

Table 11: Summary of Economic, Social and Environment co-benefits of the Project per component

Component	Economic benefits	Social Benefits	Environmental benefits
Component 1. Improvement of hydrological and meteorological observing system networks	<ul style="list-style-type: none"> Reduction in economic losses from floods and droughts as a result of improved hydrometeorological data Improved data availability for private sector use, such as for parametric insurance 	<ul style="list-style-type: none"> Increased resilience to extreme climate impacts as a result of improved hydrometeorological data Strengthened gender and social inclusion in hydromet networks in the target regions (guarding stations and making observations) Improved food and water security through measurements (water quantity/quality related) 	<ul style="list-style-type: none"> Increased use of quality hydromet data to inform environmental management of the Lake Chad Basin under climate change conditions Better planning of nature-based solutions e.g. for flood protection with better measurements
Component 2. Strengthening regional hydrometeorological information systems	<ul style="list-style-type: none"> Improved data availability and data sharing to facilitate a basin-wide collaboration 	<ul style="list-style-type: none"> Improved data availability and data sharing to facilitate responsiveness for extreme climatic events 	<ul style="list-style-type: none"> Improved data availability and data sharing to facilitate a basin-wide approach to environmental management

<p>Component 3. Identification of user needs and development of hydrometeorological products and services</p>	<ul style="list-style-type: none"> • Reduction in economic losses from floods and droughts as a result of improved forecasting • Improved forecasts for climate-sensitive sectors such as agriculture • Economic opportunities in the development of hydrometeorological products and services • Reduced economic losses as a result of improved early warning systems • Better agriculture/crops with improved planning of seeding, harvesting times through better products 	<ul style="list-style-type: none"> • Improved forecasts to guide responsiveness for extreme climatic events • Improved food and water security as a result of improved forecasts • Reduced illness and loss of life as a result of improved early warning systems • Reduction of flood induced and post-flood illnesses • Improved gender and social inclusion in the implementation of early warning systems (local level and community solutions) 	<ul style="list-style-type: none"> • Improved environmental protection through timely provision of relevant information and better service
<p>Component 4. Training of project stakeholders and knowledge development</p>	<ul style="list-style-type: none"> • Enhanced operational efficiency of National Meteorological and Hydrological Services (NMHSs) 	<ul style="list-style-type: none"> • Strengthened capacity of NHMS staff • Implementation of a gender and socially inclusive approach within NHMS and other relevant stakeholders 	<ul style="list-style-type: none"> • Increased environmental protection through improved information capacity and better service provision
<p>Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services, and communication and timely diffusion of appropriate product and services to end users</p>	<ul style="list-style-type: none"> • Reduced economic losses as a result of enhanced understanding of climate information products 	<ul style="list-style-type: none"> • Improved access to, and understanding of, climate information at various levels • Inclusion of a gender-sensitive and social inclusive approach at all levels 	<ul style="list-style-type: none"> • Improved efficiency in water use at all levels • Enhanced sustainability of hydrometeorological monitoring through its regular funding by policy makers and users who better understand its importance.
<p>Component 6. Plans and communities' response capacity</p>	<ul style="list-style-type: none"> • Reduced economic losses as a result of climate-resilient risk management practices • Identification of climate-resilient economic opportunities • Economic opportunities as a result of the implemented community-led climate change adaptation plans 	<ul style="list-style-type: none"> • Increased capacity to undertake climate change adaptation • Enhanced gender and social inclusion as a result of inclusive risk management plans • Reduced workload for women (caring for the sick) due to better preparedness to disasters • Better integration of men and women's specific priorities and needs ensuring the inclusion of traditional practices 	<ul style="list-style-type: none"> • Enhanced environmental management practices as a result of integrated climate change adaptation practices.

Project outcomes will lead to an easing of these tensions by contributing to a better knowledge/control of resources and production systems, which should favor a definition of documented rules, an efficient organization/planning and a better management of space for a more equitable access to the natural resources of the basin. Better management of the basin's resources will foster access to social services, including water, sanitation, energy and agrometeorological information, which is essential not only to help communities build climate resilience, but also to strengthen fractured relationships between different social groups. The information generated by the project activities will, for example, help to develop a more efficient agricultural calendar, including the determination of planting periods. It will also enable not only for a better organization of activities in the floodplains of the basin, especially fishing which is of particular interest to women, but also for a better management of space to limit tensions between users of the various forms of use (fishing, agriculture, livestock, etc.) of these plains.

As indicated in Part I, the population of the conventional basin (estimated at 47 million inhabitants in 2014, and over 50 million in 2023) will directly or indirectly benefit from the EWS established/strengthened through the proposed project. Direct beneficiaries are those that have access to a communication channel such as radio and mobile phones, which is estimated at 45%, so 22.5 million inhabitants. A more conservative approach has been taken for the community

plans, as due to time and budget constraints, they will be limited to the pilot sites and only initial support to implementation will be provided; estimated direct beneficiaries are 100 people per community per country, with a total of 500 in the five countries; considering that each community would share these plans with their neighboring community, the total number of direct and indirect beneficiaries of the community plans is 2500. Nevertheless, any intervention developed under the project take into account gender needs to ensure that it benefits everybody in the communities. Activities have been designed in a way that involve women and youth, especially in training on climate-sensitive agricultural approaches. In addition, meaningful participation of women in decision-making processes will enable them to contribute as agents of change in all circumstances, with climate change actions then benefiting from the ideas, knowledge and other resources they bring to bear in developing effective and sustainable climate change adaptation and mitigation solutions. Such meaningful participation will be ensured because the project interventions have been designed in accordance with the results of the gender baseline analysis (see **Annex 4**) and Key performance indicators (KPIs) that include gender and social inclusion. The project will integrate women, smallholders and farming communities into the water resources management process, thereby increasing their resilience to the effects of climate change.

According to the Adaptation Fund's classification, this project is expected to be Category C, and will not have negative environmental or social impacts. An environmental and social risk management plan aligned with the Adaptation Fund requirements has been developed to ensure that the project is compliant with the environmental and social policies and principles of the Adaptation Fund (see **Annex 3**). During project implementation, the environmental and social risk management plan would be disseminated to stakeholders, with a view to adopting appropriate measures to mitigate adverse effects of project activities, if any. A grievance mechanism (see Part II, section L.) is also included to address potential social and environmental effects during project implementation, which considers how community complaints will be addressed.

Transboundary benefits of the project also exist and amply justify the proposed regional approach. The water balance of Lake Chad depends on the inflow from the Chari-Logone system, which provides 80 to 85% of the inflow. The size of the lake and its floodplains are therefore largely determined by the inflows from the Chari-Logone system, including rainfall in the mountainous regions bordering the basin in Central Africa and Cameroon. Under these conditions, the modernization of hydrological monitoring in Cameroon and Central Africa republic leads to an improvement in the forecasting of water inflows, not only in the bordering plains of the Chari-Logone system, but also in the Lake itself, which also benefits the riparian populations of Niger (northern basin of the Lake) and Nigeria and Chad. The same applies to the prevention of catastrophic floods in the riparian metropolises such as Kousseri and N'Djamena. A good knowledge/prediction of the water inflow in the Lake and the floodplains of the Chari-Logone system also gives an idea of the nature of the dry season pastures that benefit not only all the transhumant herds coming from all the countries of the region, but also the water birds coming from Europe in winter. By contributing to better hydrometeorological information in the basin, the project will therefore also contribute to global efforts to solve major environmental problems and thus also benefit the international community.

There are many other related, indirect and ancillary benefits to the modernization of hydrometeorological services, other than disaster prevention. These include potential consequences of the project results that are not explicitly linked to specific activities, such as the contribution to the scientific output that allows a better understanding of regional and global phenomena. However, their quantification remains difficult due to conceptual limitations or data restrictions.

These benefits also relate to the use of hydrometeorological data and information in the design of water-related development projects, including basic socio-economic infrastructure. They also concern the improvement of food security in rural areas, where the most vulnerable populations live. Indeed, the production and dissemination of agrometeorological information to farmers should not only increase the average productivity of the agricultural sector, which is one of the main sources of employment in the region, but also make it possible to limit agricultural losses due to drought for example. In addition, the prediction of flood levels in the plains (both those around the lake and those along the rivers) allows for better organization of flood recession crops and fishing activities, as well as the quality of dry season pastures, which are of particular interest to women and the most vulnerable populations in the region. The overall benefit of the project includes, among others, reducing vulnerability and improved resilience and livelihoods of the vulnerable populations.

The project will build the capacity of flood emergency actors, but also of NMHSs and the LCBC, in the collection, processing and archiving of hydrometeorological data, as well as in the development and delivery of better-quality products and services. It will help end-users to use hydrometeorological products and services effectively. Reliable, readily available data and high-quality information products will enable all stakeholders to promote resilience to climate change, make informed decisions and develop more appropriate strategies for more appropriate adaptation to change.

D. Describe or provide an analysis of the cost-effectiveness of the proposed project/programme and explain how the regional approach would support cost-effectiveness.

The main differences between the regional approach proposed by this project and the national interventions lie in the sharing of certain costs and data. For example, if one assumes that the costs of project governance are equivalent at regional and country level, these costs would be divided by five under the present proposal.

One of the main conclusions of the high-level discussions of the World Meteorological Organization's Hydrology Conference, held in May 2018, recognized that the sustainability of water resources and the reduction of associated disaster risks can only be ensured by addressing the entire water data value chain, from sustainable data collection to the production of efficient hydroclimatic services, which enable informed decision-making. The assessment of the cost of the project to provide the services must therefore take into account the whole value chain. The figures provided in Table 9 showing the project components at a total cost of US\$ 10.69 million take into account the whole process, the cost-benefit analysis (see **Annex 1**) and recent studies from the region. It is understood that in-kind contributions (staff involved in the development of activities, offices, equipment already available, historical data, etc.) made by partner countries and institutions are not taken into account in the estimates provided.

The project is designed in a cost-effective way with a high return on investments. Implemented activities are such that they will have a long-term impact (estimated in 15 years, based on the average life cycle of the infrastructure (hydrometeorological equipment) and will build on existing WMO programmes and initiatives. The project being developed in the broader framework of the WMO HydroHub Phase II will leverage investments by other donors in the tools and networks that have been developed through e.g. the proposed Innovation Calls.

As far as benefits are concerned, it should be recalled that hydrometeorological products and services are considered, for the most part, as public goods and as such, are considered as non-market goods. Assessing the benefits associated with such products is therefore complex and the literature provides very little direct information on their economic value. However, as with the United Nations Economic Commission for Europe ([UNECE](#)), [Policy Brief on the Benefits of Transboundary Water Cooperation](#), there are guides to estimating the expected benefits of a project such as ours. However, data and time constraints limit our ability to make such an assessment. Therefore, our assessment of benefits will be based on assumptions that will be formulated using data and information from the literature. This evaluation will concern the socio-economic benefits of hydrometeorological monitoring, including the reduction of losses generally caused by disasters related to hydroclimatic events.

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The improvement of a hydrometeorological information system and the establishment of an early warning system in the Lake Chad Basin will lead to a reduction in the losses generally caused by disasters linked to violent hydroclimatic events, particularly floods and droughts. Such a system allows, for example, exposed populations to better anticipate floods (e.g., relocation of populations and assets to higher ground). The benefits resulting from the implementation of such a system represent the part of the average disaster losses avoided by the system in place. In the case of periodically flooded plains, knowledge of the nature of the floods gives an idea of the expected fishery products, the areas available for flood recession crops, the quality of dry season pastures, etc. It should also be noted that the project was developed using a co-design approach, with the aim of ensuring that users and beneficiary communities take ownership of the projects, but also contribute to the collection of data and the caretaking/protection of the facilities. The proposed project covers the whole hydromet value chain from measurements and data to EWS and warning dissemination, products and disaster risk reduction and communication to the public, in that sense cost-benefits of the EWS is even higher than only infrastructure investments.

An economic analysis is necessary to estimate both the costs and benefits of the proposed project and thus justify its relevance. This involves a quantitative assessment of the costs and benefits of the activities envisaged under the project. Assessing the benefits associated with hydrometric monitoring services is complex; however, many studies have been carried out on the benefits of investing in the development of hydrometeorological infrastructure and services, including by [Hallegatte \(2012\)](#), [WMO et al. \(2015\)](#), [Hallegatte et al. \(2017\)](#), [Gardner et al. \(2017\)](#) and [Kull et al. \(2021\)](#), which led to benefit-cost ratios between 2 and 36. Other references in the literature cite much higher benefits in some countries. For example, early warning systems for storms, floods and droughts in Asia indicate a potential return of up to US\$ 559 per dollar invested. These figures confirm WMO Secretary-General Jarraud's statement in 2007 that "Traditionally, the overall benefits from investments in meteorological and hydrological infrastructure have been estimated in several countries to be in the order of 10:1".

In the context of the proposed project, a preliminary cost-benefit analysis (CBA) was carried out. **Annex 1** describes the approaches and results of the quantitative assessment of the benefits and cost-benefit presents the cost-benefit analysis calculations; and the [Excel file the description of the cost-benefit analysis and results](#), while a detailed analysis both at regional and national levels (in the five countries of the Lake Chad Basin) will be done during the project implementation, under Output 5.1. The cost-benefit analysis indicates that the investment is economically efficient, meaning they will produce socioeconomic benefits greater than their costs. An economic analysis is necessary to estimate both the costs and benefits of the proposed project and thus justify its relevance. This involves a quantitative assessment of the costs and benefits of the activities envisaged under the project. Considering the very conservative approach and assumptions applied throughout the analysis, the results are considered robust. The investment is

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economically efficient. Considering that such investment is relatively low in cost, is economically efficient, protect lives and properties, and contribute to economic development and resilience, it should be considered for priority financing.

Significant economic gains can be expected from the project; both in terms of reduced losses linked to climate-related hazards and increased financial returns/productivity in key economic sectors like agriculture. The Net Present Value (NPV) of the project is estimated at USD 395 million at 5% discounting rate as a regional investment, against USD 363 million at 5% discounting rate for five separate national projects. Sensitivity analysis shows that NPV is still positive and high (USD 216 million for the regional project) even if the project benefits are 30% lower than expected.

E. Describe how the project/programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist. If applicable, please refer to relevant regional plans and strategies where they exist.

The project proposal is part of the [LCBC's strategic action plan](#), developed in agreement with its member countries, based on their priorities, including national climate change adaptation plans. As such, the project will build on existing initiatives at national, regional and international levels. The project will also be in synergy with all other ongoing and planned initiatives in collaboration with other partners, including [AMCOMET](#), [ECOWAS](#) and [ECCAS](#), the African Development Bank and the World Bank's Global Facility for Disaster reduction and Recovery ([GDFRR](#)), as well as the "[Lake Chad Basin Vision 2025](#)". A study to assess armed conflict in the Lake Chad Basin ([adelphi, 2019](#)) shows, among other things, how climate change interacts with other elements of the crisis. Most of the 10 entry points proposed to help address this crisis will be covered/addressed in this project proposal. These include better climate and hydrological information, invest in governance and institutional development, address gender inequality and human rights violations, adapt to climate change and manage resources, information and communication technologies, broaden access to and scope of services, etc.

Two out of the five countries participating in the project are members of the Economic Community of West African States (ECOWAS), Niger and Nigeria, while the other three are members of the Economic Community of Central African States (ECCAS), Cameroon, CAR and Chad. ECOWAS has developed and implemented strategic plans and policies in its region, including its policy on disaster risk reduction ([ECOWAS, 2006](#)) and the ECOWAS Hydromet Initiative, which is currently finalized ([ECOWAS, 2022](#)) and which formulates a coherent regional strategy for financing hydrometric services for the benefit of member countries. The total cost of all the proposed project ideas is estimated at US\$261.5 million. This is not a project, but rather an overview of the expected investment needs at national and regional level to increase resilience to extreme weather and climate events in West Africa by strengthening the capacity of national institutions responsible for meteorology and water resources, as well as disaster response and civil protection.

With the support of the World Bank, ECCAS has assessed the NMHSs of its member states and drafted a regional framework to support the modernization of these services to improve decision-making for flood and drought management ([ECCAS, 2020](#)). The outcome of the evaluation shows that there are many challenges to the proper functioning of NMHSs in the five member countries. These include inadequate budgets and lack of investments, inability to recruit and retain qualified staff, outdated equipment and inadequate systems in place, which do not allow NMHSs to improve their services. These results are only one step in the process initiated by ECCAS. A guidance note for improving early warning systems (EWS) in Central Africa will subsequently be developed to provide guidance and advocate for best practice and expertise in EWS. Workshops are also planned to develop a draft regional framework for improving hydromet services and an action plan.

As for the **international legal framework for environmental protection**, it is noted that international environmental conventions are important for the implementation of Vision 2025 and the Lake Chad Basin Water Charter. They contain major principles and rules for the protection of the environment and organize interstate cooperation in the field of the environment. They constitute the framework within which technical and financial assistance is provided to developing States to ensure the protection of the environment. They are therefore major instruments for implementing the LCBC Vision 2025 and the Water Charter. All five countries in the Lake Chad Basin have ratified the three Rio de Janeiro conventions: (i) the United Nations Framework Convention on climate Change (UNFCCC); (ii) the Convention on Biological Diversity (CBD); (iii) the United Nations Convention to Combat Desertification (UNCCD). Lake Chad has been recognized as a Ramsar site in 2001 in its Nigerian and Chadian part and in 2008 in its Nigerian and Cameroonian part. The participating countries also ratified the Bamako Convention on Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (1991).

The current **international legal framework of Lake Chad** consists of the Convention and statutes relating to the development of the Lake Chad Basin signed in Fort Lamy (N'Djamena) on May 22, 1964. These two conventional instruments were initially adopted in 1964 by four countries (Cameroon, Niger, Nigeria, Chad) to deal with development problems centred on the lake Chad in an area of 427,000 km², called the "conventional basin". The conventional basin

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has been extended as new Member States have joined and now covers an area of nearly 970,000 km², spread over six countries: Cameroon, Libya, Niger, Nigeria, the Central African Republic and Chad.

An Agreement on common regulations on fauna and flora was signed on December 3, 1977 in Enugu by four States (Cameroon, Niger, Nigeria, Chad) for the protection of fauna and flora. Through this convention, the States Parties undertake to protect terrestrial fauna (through the listing of protected species, the fight against trafficking in certain specimens and trophies, the regulation of reptile hunting and the creation of protected areas) and aquatic fauna (through the regulation of fishing methods, the establishment of fishing statistics, the regulation of the export and import of fish as well as the fight against pollution) (art. 1 -11).

The **Lake Chad Basin Water Charter** is a major instrument for protecting the environment of the basin in that it includes numerous and important provisions on the protection of natural resources. It thus emerges that the objective of the Water Charter is the sustainable development of the Lake Chad Basin, by means of an integrated, equitable and concerted management of the shared water resources and the environment of the Basin (art. 2). To meet the identified challenges in the Water Charter, it is essential to have reliable data and information, in particular hydroclimatic data of high quality, which requires a great investment in data collection and analysis. Close and rigorous hydrological monitoring is therefore essential to better understand the mechanisms at play. Therefore, the present project will help meet these challenges. Among other things, it will contribute to the revival of NMHSs' activities, the modernization of the data collection and analysis system, the strengthening and sustainability of technical and institutional capacities through training sessions to be continued as continuous training mechanism, and the development of decision-making tools that are essential for better implementation of the dispositions of the Water Charter.

Regarding groundwater, better monitoring is therefore essential to improve understanding of the hydrogeology of the entire basin, aquifer recharge, interactions between surface water, soil moisture and groundwater, etc. Given the extent of the financial resources required, most of the project's activities in this area will be based on those from ongoing projects (e.g. the BGR project). The expected results will, however, provide a sufficiently solid basis as an initial step for further detailed analysis of the groundwater resources in the basin, and will enable the updating of the water resource allocation and planning model in the Lake Chad Basin.

As for regional collaboration, the project aims to provide hydromet information to decision-makers, enabling them to design efficient infrastructures and adequately manage water resources, including in flood and drought situations, throughout the Lake Chad Basin. This objective can only be achieved if there is close collaboration between countries, and in particular the sharing of data between the technical departments concerned and the LCBC. In the absence of the entry into force of the Water Charter, one of whose requirements is that Member States organize hydrological monitoring in their national portion of the Basin and exchange data with other countries and the LCBC, it is planned that participating countries will sign a specific agreement for data sharing, in accordance with the provisions of the Lake Chad Water Charter, with the WHYCOS principles and the WMO unified data policy.

At the LCBC level, a Lake Chad Climate Change Development and Adaptation Plan ([LCBC, 2015](#)) has been developed and validated by member states, with the support of the World Bank, in coordination with the French Development Agency (AFD). The plan proposes a set of investment needs grouped into 7 major themes (one of which concerns the management and protection of the basin's water resources and the other the dissemination of information, improvement of knowledge and monitoring of the environment), for a total estimated amount of 916 million euros.

At the level of the participating countries, climate change, which is now well-known in Africa, has been integrated into environmental policies and strategies, as it is the case in almost all sub-Saharan African countries. The five countries participating in the project have signed and ratified the United Nations Framework Convention on Climate Change ([UNFCCC](#)) and subsequently developed national communications on climate change in accordance with the relevant provisions of the UNFCCC. All five countries have also recently submitted an update of their Nationally Determined Contribution ([NDCs](#)), outlining greenhouse gas emission reduction targets, together with proposals for adaptation measures. This demonstrates their willingness to contribute effectively to the global effort to combat global warming, on which an important part of their economies, mainly associated with the primary sector such as agriculture, livestock and subsistence fishing, depend, especially in their various national portions of the Lake Chad Basin. In the [COP21](#), countries have also determined, each at the national level, the actions to be undertaken as part of their respective contributions to the global response to climate change. Within this framework, key national priorities have been identified and to be taken into account to the largest extent possible in this project. These priorities focus on improving the resilience of the agriculture, livestock and forestry sub-sectors, water resources, fisheries, wildlife, health, capacity building of stakeholders at all levels, especially in the regions where the respective portions of the Lake Chad Basin are located in the countries:

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Deleted: Among the specific objectives relating to the environment, mention should be made of the preservation of ecosystems and their biodiversity as well as the qualitative management of wetlands. These are (i) the determination of the principles and rules relating to the preservation and protection of the aquatic systems of the Basin and their biological diversity, in particular the fight against pollution and the sustainable management of fishing; (ii) establishment of a polluter-pays principle at the basin level; (iii) carrying out environmental assessments and impact studies. ¶ ... [1]

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- The Government of **Cameroon** has developed the country's first [National Adaptation Plan \(NAP\)](#) in 2015, which is [currently under evaluation](#);
- The **Central African Republic** has developed its first [National Adaptation Plan \(NAP\)](#) in February 2022;
- The **Niger** [National Action Programme for Adaptation \(NAPA\)](#) was developed in 2006. An integrated climate adaptation strategy specific to the rural sector ([SPN2A](#)), that is of particular interest to the national portion of the Lake Chad basin, was subsequently developed in 2020;
- The **Nigerian** National Adaptation Strategy and Plan of Action on Climate Change for Nigeria ([NASPA-CCN](#)) was developed in 2011. In December 2021, Nigeria has launched a new project to develop National Adaptation Plan, aiming to strengthen the capacity of the government to plan and budget for actions that build resilience to climate change impacts;
- As a follow-up to its national climate change adaptation programme ([PANA-TCHAD](#)), developed in 2009, the Government of **Chad** submitted its first [National Adaptation Plan \(NAP\)](#) in February 2022.

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The action plans proposed in the various documents by the countries are broken down into programme/project sheets, with an order of magnitude of the financial resources needed for implementation. In addition to national budgets, it is also expected that these resources will be mobilized from partners as well as from international climate finance initiatives, including the Adaptation Fund. Overall, policies in key sectors such as agriculture, infrastructure, energy and others have only marginally reflected or made concrete programmatic adjustments in response to climate change. Concrete actions taken to date are very limited, especially in the national portions of the Lake Chad Basin.

Ultimately, the proposed project can be seen as a concretization of the wills expressed both at the country level and at the level of the regional economic institutions but have so far remained as project ideas not yet concretized. Based on technical discussions with the countries, project activities were designed to close the gaps. It therefore remains consistent with the will expressed in the regional and national adaptation programmes of action and the poverty reduction strategies.

F. Describe how the project/programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

The Lake Chad Basin project will be aligned with the requirements of the Adaptation Fund's Environmental and Social Policy (ESP). The Implementing Entity accredited by the Adaptation Fund, WMO, as well as the LCBC, GWP-CAF and relevant national partners, will ensure that the project follows the procedures outlined in the ESP. In addition, the proposed project will involve the Ministries that implement project-relevant national technical standards and will engage the Economic Community of Central African States (ECCAS) and the Economic Community of West African States (ECOWAS) that can assist in tracking compliance against the national, regional and international technical standards. At the same time, NMHSs of Member of the WMO (such as those of the five countries) comply with the WMO Technical Regulations, and this will be tracked by WMO. This overall approach will ensure that activities financed by the Adaptation Fund reflect local needs and circumstances and build on national actors and capacities.

National partners and stakeholders were consulted during the development of the project proposal to ensure that all activities comply with relevant national standards, as well as environmental and other statutory laws and regulations of the participating countries (see Part II, section I. below for the list of stakeholders consulted). This document has also been submitted for validation to national stakeholders, including, inter alia, the Adaptation Fund's in-country Focal Points (Designated Authorities), the Permanent Representatives of NMHSs and other partner institutions in the implementation of the project in the participating countries.

As part of the Environment and Social Impact Assessment, a review of the applicable national laws and Lake Chad Basin regulatory framework for environment and social management was carried out (see **Annex 3** for details).

As for the **national legal environmental protection**, there are several laws, policies, instruments and administrative frameworks available to support sustainable environmental and social management, including sectoral guidelines to be undertaken and followed, respectively during the planning, design, implementation and operation phases of the project to ensure compliance with the AF principles as well as environmental and social compliance requirements for participating countries. Thus, the framework laws on the environment and water which constitute major instruments for implementing environmental national policies and water resources laws exist in the five participating countries (**Table 12**).

Table 12: Framework environmental and water laws of participating countries

Country	Framework law on the environment	Water Resources Law
Cameroon	Law No. 96-12 of August 5, 1996 on the framework law relating to the Environmental management in Cameroon	Law No. 98-005 of April 14, 1998 on the water regime

Chad	Law No. 14/PR/98 defining the general principles of Environmental protection in Chad	Law No. 16/PR/99 of August 18, 1999 on the Water Code, amended and completed by Ordinance n° 018/PR/2011 ²
Central Africa	Law No. 07.018 of December 28, 2007 on the Code of the Environment of the Central African Republic	Law No. 06.001 of April 12, 2006 on the Water Code of the Central African Republic
Niger	Law No. 98-056 of December 29, 1998 on the framework law relating to Environmental management in Niger	Ordinance no. 2010-09 of April 1, 2010 on the Code of water in Niger
Nigeria	National Policy on the Environment, 2016.	Water Resources Decrees, 101 of August 28, 1993

In accordance with these national laws, full-fledged environmental and social impact assessments are only required for projects with high or substantial risks. Other projects only require to demonstrate: (i) the expected effect of the project on the environment; (ii) any negative effects of the project which can be avoided; (iii) sufficient explanation of the environmental sustainability of the project; and (iv) the precautions adopted for containing any negative effects of the project. This proposed project is an environmentally positive project with no potentially adverse impacts, and it is aligned with the Adaptation Fund's Environmental and Social Policy and Principles, the countries environmental and social laws and regulations and the international conventions and standards.

The potential impacts of project activities relate to land acquisitions and the production of waste from the use of batteries at hydromet stations. The legislative and regulatory texts relating to these impacts will be analyzed in this section. The main national texts relating to land acquisition and waste management are presented in the **Table 13**.

Table 13: Legislative and regulatory texts related to land acquisition and waste management

Country	Land acquisition	Waste management
Cameroon	Ordinance No. 74-1 of July 6, 1974 establishing the land tenure system and determining the allocation framework lands; Decree No. 2003/418/PM of February 25, 2003 fixing the rates of compensation to be allocated to the owner victim of destruction for public utility of cultivated crops and trees.	Law No. 96/12 of August 05, 1996 on the framework law relating to environmental management.
Chad	Law No. 25 of July 23, 1967 on the limitations of land rights highlights the need for development and the essentially agricultural acceptance of any land development. Law n°23 of July 22, 1967 and its implementing decree n°187 of August 1, 1967.	Law n°014/PR/98 of August 17, 1998 defining the general principles of Environmental Protection.
Central Africa	Ordinance No. 71/022 of 17-03-71 supplementing the provisions of Ordinance No. 71/015 of February 11, 1971, relating to the procedure for allocating state land and modifying the composition of the state advisory committee. Law No. 96.018 of May 4, 1996, establishing a general procedure involuntary resettlement.	Law No. 07.018 of December 28, 2007 on the environmental code.
Niger	Law No. 61-37 of November 24, 1961, regulating expropriation for public utility and temporary occupation amended and supplemented by Law 2008-037 of July 10, 2008 relating to the involuntary displacement and resettlement of populations (Article 3). Ordinance No. 99-50 of November 22, 1999 setting the rates for the alienation and occupation of State-owned land (article 1) fixing the basic prices for the alienation of land.	Law No. 98-56 of December 29, 1998 on the framework law relating to environmental management. Waste management includes the collection, transport, storage, sorting and treatment operations necessary for the recovery of reusable elements and materials as well as the deposit or discharge into the natural environment of all other products under conditions specific to avoiding nuisance (art. 62).
Nigeria	Nigeria Land use decree of 1978, chapter 202; The State holds property rights in land, individuals are granted usufructuary rights and the introduction of an administrative system for land allocations instead of relying on market forces. Land use act provides equal land acquisition, however customary law, sharia law, and traditional gender norms prevail in land resources management.	National Environmental Protection (Management of Solid and Hazardous Wastes) Regulations, 1991; regulates the collections, treatment and disposal of solid and hazardous wastes from municipal and industrial sources.

G. Describe if there is duplication of project/programme with other funding sources, if any.

During project proposal preparation, and taking into account the [African Partner Coordination Mechanism](#), the ongoing projects related to the thematic area of this proposed project have been assessed and potential synergies have been

² <http://humanright2water.org/wp-content/uploads/2022/12/HR2W-and-HRHE-Mapping-for-Chad-COLORS.pdf>

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identified. Several initiatives are underway or planned in the region and/or in the Lake Chad Basin, with the support of technical and financial partners such as the World Bank (WB), the United Nations Development Programme (UNDP), the African Development Bank (AFDB), and other development partners such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), the German cooperation (GIZ, BMZ), the French Development Agency (AFD), as well as funding initiatives such as the Climate Risk and Early Warning Systems (CREWS), the Global Environment Facility (GEF), etc. These projects and programmes have been screened to avoid duplication and to develop synergies. It should be noted that most of these initiatives focus on situation assessment, sectoral monitoring or pilot sites. They have their own field and area of intervention in line with the strategic axes defined in the Strategic Action Programme, including in terms of capacity building for LCBC and its Member States. Although these past and recent initiatives recognize the value and importance of hydrometeorological monitoring for socio-economic development and the preservation of the Basin's resources, none of them has focused on setting up an adequate mechanism to effectively ensure functional and sustainable knowledge for sound water resources management, disaster risk reduction or to organize actions between technical services and decision-making institutions to mitigate their impacts. The present project is designed to build on, synergize and complement the results of these activities. During project proposal preparation, meetings have been organized with some partners to clarify the framework for collaboration. These partners will be invited to the steering committee meetings as observers at their own costs (see Part III, section A. below). A summary of the main projects, based on existing reports, publications, and meetings with partners, is presented in **Table 14**. Most of the listed initiatives have been able to identify issues and gaps either in sectoral monitoring (groundwater, for example, for projects financed by BGR and BMZ), or pilot sites, or only certain countries in the Basin. Out of a total of 25 projects, only seven were developed and/or implemented in collaboration with the LCBC, of which three concern the whole Basin, while the other four concern only specific LCBC Member States. The other projects are national or regional initiatives or concern other basins than the Lake Chad. As a result, the hydroclimatic data available (in the countries and at the LCBC) on the Lake Chad Basin have too many gaps to be able to adequately contribute to economic and social development, preservation of the natural environment, prevention of risks linked to severe hydroclimatic events, as well as providing a precise idea of their evolution over time. Building on lessons learned from past initiatives and taking into account the recent LCBC Strategic Action Programme, the Lake Chad Basin Master Plan, as well as the requirements of the Lake Chad Basin Water Charter, this proposal aims to fill in the gaps and respond to national and Basin-wide needs in a holistic approach. In addition, the setting up of the project's monitoring network will take into account existing stations and equipment already in place or planned for installation as part of other projects, and therefore, there will be no duplication, but complementarity between this and other projects. Close collaboration with the partners of these projects during the implementation of the present project (and particularly during the start-up phase of activities) is essential to consolidate and refine these collaborations, but also to develop new synergies or other new areas of complementarity.

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Table 14. Other ongoing or planned projects and programmes in the region.

Projects	Objectives	Possible synergies/ complementarities
CREWS Chad 2019-2024 CREWS Niger 2017-2022 CREWS West Africa 2018-2023 CREWS Central Africa 2022-2026 CREWS Initiative	These projects aim at improving the operational capacities to produce and deliver warning services. Improve the availability of, and access to, early warning systems in participant countries; develop seamless operational forecasting systems based on optimal regional cooperation in order to enhance the efficiency of NMHSs and other EWS stakeholders. CREWS Central Africa has just recently been approved and is at its inception phase.	The results achieved in Chad and Niger will be utilized in the development of this proposal. The experience gained will also be used in the other three countries in the selection of pilot sites for the project and in the dissemination of knowledge and tools to stakeholders. Innovative solutions being tested in these countries (such as the RAINCELL technique for estimation of the rainfall using radio waves from mobile phones, and the use of altimetry to measure water levels from satellites) will be scaled up to the region.
Strengthening Resilience to Climate and Covid-19 shocks through Integrated Water Management on the Sudan – Chad Border area (SCCIWM) 2022-2025 Adaptation Fund	The project objective is to strengthen the regional agro-ecology and sanitation resilience to climate change and COVID-19 in the border area between Chad and Sudan. This will be achieved by enhancing regional water mapping, monitoring and governance capacity to better adapt to drought events; by improving water availability, water use efficiency; promoting adaptive agriculture production systems and multipurpose water technologies for improved livelihoods, food security and sanitation of rural households; and developing a Regional Natural Resource Management Plan.	The project has objectives similar to those of our proposal and plans e.g., to develop integrated information systems on water resources for climate change adaptation in regional agriculture and food systems. Complementarities will be developed at project inception and coordination will be in place during implementation. Results of this project in Chad will be scaled up to the Lake Chad Basin.
Emergency Flood Control Project PULCI (Cameroon) 2014-2019 World Bank	The project development objective was to rehabilitate water infrastructure and improve disaster preparedness, including the establishment of a few Hydromet monitoring stations in target areas (Far North Region of Cameroon).	The Hydromet monitoring network set up within the framework of this project (mainly in the Far North Region of Cameroon) will be taken into account and capitalized by the present project. These include Hydromet observation stations equipped with new generation equipment that will be taken into account and capitalized by this present project.
Programme to Rehabilitate and Strengthen the	This project aims at improving the resilience of the populations in 5 LCBC member states. The acquisition	The hydrological and meteorological monitoring network set up as part of this project will be

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Resilience of Socio-ecological Systems of the Lake Chad Basin PRESIBALT 2016-2022 AFDB	of the equipment is made at the regional level, and it will benefit the 5 member countries through strengthened cooperation. More specifically, project activities support the acquisition and installation across the 5 countries of: - 32 automatic controlled hydrological stations; - 24 automatic weather stations; - 30 direct reading rain gauges.	taken into account and capitalized by this present project. In addition, the proposed project will address issues related to the setup of the stations through appropriate technical specifications based on the identified problems (e.g. energy).	Deleted:
Lake Chad Basin Regional programme of the conservation and sustainable use of Natural Resources and energy 2019-2024 LCBC-AfDB-GEF	This project aims at preserving aquatic and agroforestry ecosystems and ensuring sustainable use of resources, including implementation of piezometers and acquisition of piezometric recorders. More specifically, the project activities aim at: - the acquisition of 500 water level gauges and 5 complete gauging equipment; - the construction of 60 piezometers and the rehabilitation of 40 others in the Basin; - the acquisition of 100 piezometric recorders.	The equipment of the piezometric monitoring network set up in the framework of this project will be capitalized by the present proposal. Note that the acquisition of groundwater monitoring equipment is not foreseen in the proposed project, as it will benefit from the existing piezometers provided by this project.	Commented [AS15]: CAR5
Sustainable management of water resources in the Lake Chad basin 2019-2022 GIZ, BMZ	This project aims at improving water resource management for increasing agricultural production considering the effects of climate change, in 2 LCBC member states: Cameroon and Chad. The project contributed to improving knowledge of climate change by the local populations, and to strengthening the resilience of populations to climate change in pilot sites.	The experience gained in the two target countries (Cameroon and Chad) will be used in the other three countries, particularly for the dissemination of knowledge and tools to stakeholders.	Field Code Changed
Sustainable groundwater management in the Lake Chad Basin 2019-2022 BGR, BMZ	This project supported the LCBC and 2 member states (Cameroon and Chad) in sustainable groundwater management under climate change conditions.	The activities of this project concern only Cameroon and Chad, including the realization of some piezometers. The results and facilities of this project will be capitalized by the proposed project.	Field Code Changed
Improving the management of Lake Chad by implementing the strategic action plan for the Lake Chad Basin through resilience to climate change and reducing pressure on ecosystems 2018-2023 LCBC-GEF	This project contributed to the achievement of ecosystem-based, integrated and resilient management through improving water quality and quantity, protect biodiversity and sustain livelihoods. The project aims at the development of a Disaster Risk Reduction and Climate Change Adaptation Strategy Framework Document in the Lake Chad region; the study on the facilitation of the harmonization of national legal, policy and financial instruments of the LCBC for the implementation of the Lake Chad Basin Water Charter and the improvement of the availability and accessibility of data and information on Lake Chad water resources and ecosystems.	The experience gained, limited to the Lake region alone, will be used in this proposed project for the other regions of the basin. In particular, the Lake Chad Basin Water Charter will drive the operationalization of the information systems to be put in place by the proposed project.	Field Code Changed
Lake Chad Region Recovery and Development Project (PROLAC) Cameroon, Niger, Nigeria and Chad 2020-2025 The World Bank's International Development Association (IDA)	Contribute to the recovery of the Lake Chad region by supporting crisis coordination and monitoring, connectivity and agricultural livelihoods in selected provinces of Cameroon, Niger, Nigeria and Chad. The project aims to establish a regional knowledge management platform to support database creation, monitoring and integration through a web-based platform; dialogue with academic and research institutions, data collection, capacity building and dissemination.	The dialogue and the Knowledge Platform set up within the framework of the project will make it possible to establish close links with the universities of the countries bordering Lake Chad. They will support the popularization of the results of this project as well as the communication and sharing of knowledge with users and the scientific community. The dissemination of knowledge and good practices should facilitate the replication of lessons learned by government institutions and other communities facing similar problems in other parts of the world.	Field Code Changed
Regional Strategy for the Stabilization, Recovery and Resilience of Boko Haram Affected Areas of the Lake Chad Basin (RSS) 2018 Supported by the Africa Union and UNDP	The general objectives of this strategy are: 1. generating policies and programmes for the short-, medium- and long-term stabilization and development of the Lake Chad Basin region 2. focusing on commonalities while taking into account the particularities of each of the States concerned in the Lake Chad Basin region 3. addressing the root causes of the crisis in the Lake Chad Basin region in order to build resilience.	The activities of this project will contribute to securing the region for the implementation of bear project activities in the basin, including this proposed project.	Field Code Changed
The Niger-HYCOS Project (part of the larger World Hydrological Cycle Observing System) 2005-2018 AFD and AWF	The project strengthened the capacity of the hydrological services of the four countries participating in this project (Cameroon, Niger, Nigeria and Chad), collected hydrological data and provided reliable information on water resources through improved infrastructure. It also allowed review and quality control of historical data that will be very useful for the present project.	The feedback and achievements of this project will be used, both at the country level and at the WMO Secretariat level, to further develop the present proposal. The link with the WHYCOS system will ensure that the results of this project will be integrated into global platforms for wider availability.	Field Code Changed

Programme for integrated development and adaptation to climate change in the Niger Basin (PIDACC) 9 countries 2019-2024	The main expected outcomes of this Programme are: (a) recovery of 140 000 ha of degraded land; (b) the construction of 209 water infrastructure systems for agro-pastoral and fish farming activities; (c) the implementation of 450 sub-projects for agricultural chain development purposes and 184 youth SMEs; (d) climate change (CC) adaptation capacity building for 1,000,000 households; and (e) operationalization of a sustainable financing mechanism for sustainable natural resource management activities.	The sustainable funding mechanisms, climate change adaptation and agricultural water infrastructures can have synergies with this proposed project.
Mapping Groundwater Resources in Chad ResEau 2012-2022 Swiss Agency for Development and Cooperation (SDC)	The project goal is to increase Chad's resilience to climate variability by improving knowledge and active management of aquifers and surface water resources. The medium-term outcomes are the following: - The knowledge of water resources is improved, particularly for the priority regions identified (Central and Northern Chad), thanks to the availability of new and quality data on water resources; - National water resource management capacities are strengthened; -The data and information produced are accessible and used by partners active in the sector.	The proposed project should capitalize on phase 1 of the ResEau project which resulted in the set-up of a Water Resources Information System (SIRE) compiling 420 publications, 600 maps, 200 satellite images as well as 27 hydrogeological maps at 1:500,000 and 1:200,000 scale. Synergies can be sought especially in relation to information system and groundwater data. An interoperable information exchange system can be set up with the tools implemented under this project to capitalize on the information already collected, processed and storage. In addition, noting that this project focus on Chad, results can be replicated and scaled up for the entire Lake Chad Basin.
Runoff management in Sahelian Chad (GERTS) 2012 – 2022 Swiss Agency for Development and Cooperation (SDC)	The project aims to improve water control and erosion in the lowlands through the development of valleys with spreading sills for their agro-pastoral exploitation for the direct benefit of 350,000 people in four regions in east-central Chad. The medium-term objectives are the following: -Agricultural and livestock producers as well as local authorities ensure a sustainable and concerted management of the benefits induced by the construction of valleys managed by spreading sills; - The populations (in particular women, youth and vulnerable people) living in the lowland areas with weirs exploit the developed spaces in a sustainable and economic way; -The approach of developing inland valleys with weirs is known, promoted and scaled up with the support of public and private institutions and organizations.	Synergies can be developed with this project by the sharing and lessons learnt in relation to the specific needs of pastoralist communities in the areas of water resource management and food security.
World Bank	As part of its Cooperation for International Waters in Africa (CIWA) programme, the World Bank has initiated a needs assessment and budget estimate that would be required to fill the gaps in order for the LCBC to effectively fulfil its mandate. This assessment includes, among other things, the needs for adequate hydromet monitoring, data sharing, and the development and implementation of the necessary decision support tools.	The proposed project will benefit from the results of this assessment.
Biosphere and Heritage of Lake Chad (BIOPALT) 2017-2020 UNESCO, AfDB, LCBC	This project had a component that deals with floods and droughts and water quality.	The proposed project will be built upon the results of the project.
Improving Resilience and Water Access in the Sahel (TerresEauVie) 2019-2024 USAID	Niger is one of the countries that benefit from this project. This project focus on enhancing social and ecological risk management systems through 3 components: (a) improved water security; (b) enhanced sustainable productive land use; (c) improved management of shocks, risks and stresses.	Activities of this project are related to the proposed project in relation to the monitoring of water resources, and promotion and dissemination of the information. Results of this project will be taken into account in the proposed project.
SERVIR West Africa (phase II) 2022-2027 USAID, NASA	Niger and Nigeria are two of the countries that benefit from this project. Using satellite data and geospatial technology, SERVIR co-develops innovative solutions through a network of regional hubs to improve resilience and sustainable resource management at local, national and regional scales.	Activities of this project are related to the proposed project in relation to developing satellite-based innovative solutions for monitoring of water resources. Results of this project will be considered and possibly scaled up to the region with the proposed project.
ClimDev-Africa Special Fund / Satellite and Weather Information for Disaster Resilience in Africa (SAWIDRA) 2016-2020 AfDB, EU	The five countries in the Lake Chad Basin benefit from this project. The Satellite and Weather Information for Disaster Resilience in Africa (SAWIDRA) Project aims to improve the core capacities of the specialized national and Regional Climate Centres (RCCs) to meet the needs of DRM agencies and socio-economic sectors for effective use of weather and climate services and	Activities of this project are related to the proposed project in relation to the use of NWP. Products and results of this project will be particularly used in the proposed project as input to running hydrological models.

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	community-focused and real-time early warning systems (EWS) based on the Numerical Weather Prediction (NWP). It aims to improve the forecast and service providing capacity of national meteorological and regional climate centres in order to allow them to provide the proper inputs to the DRM agencies for their issuing of early warnings.	
Climate Services and Related Applications Programme (ClimSA) 2021-2026 EU	ClimSA's objectives are to provide members and regions of the Organization of African, Caribbean and Pacific States (OACPS) innovative and collaborative solutions to manage climate-related risk considerations in their sustainable development policy, planning and practice decisions, by (i) contributing to strengthening the production, availability, delivery and application of science-based information; and (ii) building the capacity of decision-makers at all levels.	Activities of this project are related to the proposed project in relation to the development of products and building the capacity. Products, lessons learnt, and results of this project in Cameroon and Nigeria will be considered in the proposed project.
Climate Risk Reports 2018-2023 FCDO, UKMO	Cameroon and Central African Republic benefit from this project. The climate risk reports are a joint Met Office, ODI and the FCDO collaboration to contextualize the climate variability and change in the context of the socio-economic exposure and vulnerability in ODA-eligible regions. The reports present a top-level regional overview of potential risks to development associated with climate and climate change, signposting to key issues and complexities. Climate risks out to the 2050s are assessed through a combination of analyzing current and future climate alongside socio-economic factors.	This project contextualizes the climate variability and change in Cameroon and Central African Republic, which can be considered representative of the Lake Chad Basin. They provide a good justification for the need of the proposed project.
The Africa Integrated Climate Risk Management Programme: Building the resilience of smallholder farmers to climate change impacts in 7 Sahelian Countries of the Great Green Wall (GGW) 2021-2026 GCF	Chad and Niger benefit from this project. The programme will contribute to a paradigm shift toward climate resilient and low-emission agriculture through the mobilization at scale of climate finance to build the agricultural insurance industry while strengthening existing adaptation measures and risk preparedness services and products. The regional programme is organized into three main mutually reinforcing components: (1) Climate risk preparedness; (2) climate risk reduction (adaptation and mitigation); and (3) climate risk transfer (micro and sovereign risk transfer mechanism)	Components 1 and 2 of this project include activities related to the proposed project such as weather monitoring and forecast-based early action in the context of agriculture. Products, lessons learnt, and results of this project in Chad and Niger will be considered in the proposed project.
Valorization of Investments in the Valley of the Logone (VIVA Logone) 2022-2026 World Bank	The project seeks specifically to (i) support regional water security and governance of the water resources, mainly through rehabilitation of irrigation and drainage infrastructure and support to water users' associations, (ii) promote agriculture and agribusiness production, and (iii) implement a transformational plan of SEMRY (<i>Société d'expansion et de modernization de la riziculture de Yaoua</i>) and strengthen public services.	Activities of this project are related to the proposed project in relation to the development of products and building the capacity. Products, lessons learnt, and results of this project in Cameroon will be considered in the proposed project.
Climate Promise – Phase II 2023-2027 UNDP	The second phase of Climate Promise support in CAR will be used to develop a roadmap and implementation plan for the revised National Determined Contribution (NDC). Two other objectives of this project are: - Strengthening national capacities in terms of resource mobilization and management of climate financing, with a view to the creation of a National Climate Fund; - to deepen the analysis of the link between gender and climate change with a view to improving the ownership and involvement of women, youth, people with reduced mobility in the implementation of the revised CAR NDC.	Activities of this project are related to the proposed project in relation to the resource mobilization and building the capacity. Lessons learnt and results of this project in CAR will be considered in the proposed project.
Central African Republic Emergency Food Crisis Response Project (PRUCAC) 2022-2026 WB and FAO	This project will contribute to boosting food production and building the resilience of food insecure smallholders and households.	Activities of this project are related to the proposed project in relation to the development of agromet related products and building the capacity in EWS. Lessons learnt and results of this project in CAR will be considered in the proposed project.

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Regarding to groundwater monitoring stations, noting that there are other projects (PRESIBALT, BGR) in the region making investments into piezometers and dataloggers, the proposed project will build on existing projects for all groundwater aspects.

H. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

The results of this project can be shared with other regions facing similar problems and for science. Various means are foreseen to ensure good coordination and wider dissemination of the project's achievements to a wider circle of institutions and communities, including the most vulnerable, women and youth.

1) *Knowledge management and experience sharing* – The activities of the proposed project related to the operational data collection and processing system (Components 1 and 2) will particularly benefit from WMO materials and tools such as [WMO HydroHub](#), [HydroSOS](#), [WHOS](#), [WIS/WIGOS/OSCAR](#) and [WWDI](#). A summary of the project's know-how and best practices will be disseminated internally in project reports and externally published on the web pages of the partners (WMO, LCBC, GWP and NMHSs) and in particular on the [WHYCOS web page](#), as well as through different communication channels adapted to the target beneficiaries.

The project also envisages the creation of a user community linked to the LCBC Knowledge Management Platform (PROLAC), to coordinate collaborative efforts between civil society, community groups, private companies, research institutions, international organizations and the public sector to exchange knowledge and expertise, discuss best practice and ensure the dissemination of new methods and equipment to countries (mainly through Components 4 to 6). The Community of Practice which creates connections between hydrometric practitioners from around the world to share experiences in addressing the day-to-day operational challenges faced by NMHSs, including those related to new practices and technologies, but also on flood management and early warning systems.

Under Outcome 5.2, specific knowledge management efforts will be implemented at local level, through the development of school learning and communication materials (including radio announcements, brochures, etc., in local languages), as well as the meetings and trainings that will be used to roll out EWS, with information sent to communities improved as it goes along, and lessons learned targeting local level will be shared/disseminated. An EWS section will also be added to the LCBC Community Connect platform. In addition, learning sessions will be carried out periodically with stakeholders involved including local ones, to draw lessons for the project implementation partners, beneficiaries or other external parties to the project. This will be done by, *inter alia*, working with local grass root leaders through forming committees. Moreover, every quarter, the Project Management Unit (PMU) in collaboration with the knowledge management and communication experts' team, will be responsible to highlight good practices and/or lessons learned to be discussed during annuals Project Steering Committee meetings. These activities start in year 2 of the project and will be implemented up to the end of the project, and overall budget is 362 500 USD.

The regional approach of the proposed project through Component 2 on strengthening the regional data-sharing and information system; and Components 3 and 5 on the development, testing and implementation of regional early warnings systems and plans will be a key knowledge sharing avenue that will enhance the value of the knowledge generated as part of this project.

The tools and guidelines as well as all the documentation developed within the framework of the project (all Components) will remain available in the beneficiary services and communities and on the website of the partner institutions. They will be useful for the consolidation of the results and the sharing of experience. Similarly, the training organized within the framework of the project will be destined to trainers who will share it with colleagues or other communities.

2) *Dissemination to the general public* – Dissemination of project achievements will be supported by training for NMHSs on communication and effective awareness raising on the benefits of hydrometeorological products and services especially with financial policy- and decision-makers as well as stakeholders' engagement on disaster risk reduction and climate resilience (mainly through Components 4 to 6). Appropriate means of communication (e.g. WMO, LCBC and participating NMHSs websites) will be used to publicize the results of the project to current and potential users of hydrometeorological products and services, and to promote the socio-economic benefits of sustainable Hydromet monitoring. Some products will be promoted on dedicated WMO websites, such as HydroSOS, which aims to provide information on the current state of water resources and the near future. With the support of WWDI, communication should also be directed at private sector decision-makers and policy-makers, including budget holders at the highest level of decision-making, as well as parliamentarians who vote on the state budget. Similarly, methods and tools for identifying the needs of funding partners and end-users of water information will be used. To remain credible to these users, clear communication will be provided on the uncertainties in the data and forecasts.

3) *Organization of and participation in conferences and other events* – Annual meetings of the Project Steering Committee (involving partners, key stakeholders, end-users, beneficiaries and international partners) will be organized to present the progress of the project and to refocus, where necessary, the implementation of activities to achieve the expected results. Participation in conferences and scientific meetings is also foreseen in order to present and discuss the project results. The collaboration of academics will also allow for the evaluation of the impact of the solutions proposed by the project on the effects of climate change in the region and particularly in the Lake Chad basin.

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I. Describe the consultative process, including the list of stakeholders consulted, undertaken during project/programme preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

WMO, GWP and LCBC have a long history of collaboration and have a good knowledge of the project stakeholders as well as good relationship. Furthermore, the list of beneficiaries and their needs have been extended throughout the project preparation phases. In accordance with one of the objectives of its Strategic Plan validated by its Committee of Experts and the meeting of the Council of Ministers of its member countries, the LCBC had requested since 2013 the assistance of the WMO Secretariat for the development of a component of its WHYCOS programme for the Lake Chad Basin. The project document developed on a participatory basis was validated by the countries in 2015. GWP-CAF subsequently developed a project proposal on "Early Warning System (EWS) in the Lake Chad Basin" to support the LCBC and its member countries in their efforts to protect lives at risk from climate change induced disasters and help communities sustain themselves in the face of risk. The project proposal, which was to start with a pilot phase in three countries (Cameroon, Central African Republic and Chad), was validated by LCBC in 2017.

The participatory process for the development of the two projects assessed the capacity building needs of the participating countries to strengthen the data collection system and support preparedness for flood and drought management. Under the supervision of the LCBC, GWP-CAF and the WMO Secretariat, and with the support of national technical services (including NMHSs), consultations were held with institutions, users of hydrometeorological services, civil society and communities. The authorities and people consulted included mayors of cities, representatives of associations of municipalities, meteorological services, institutions in charge of monitoring water resources, civil protection services and focal points for flood management and early warning systems, NGOs, universities, etc. For the EWS, representatives of flood-prone vulnerable communities (women, elderly, youth) were also directly consulted by the countries' national consultants to gather the required information on flood and drought management.

Following a request from the LCBC to the WMO and GWP in 2019, the ideas contained in these two documents have been consolidated in one project and reconsidered on the basis of the modern tools currently available, for a revitalization of Hydromet monitoring and early warning activities for water-related disaster risks in the Basin. An adapted and modern process was put in place to get the views and needs of the end-users of the products and services that such a project should generate, as well as those of the beneficiaries and stakeholder platforms agreed upon in the LCBC Water Charter, while taking into account current and planned innovations to better adapt them to the new context.

A participatory process was thus again set up for a new assessment of the situation, data collection and information for the update and development of a new document. A survey questionnaire was developed and submitted by email to the different stakeholders and potential beneficiaries of the project in the countries. [Three different stakeholder questionnaire forms](#) were prepared, each one for hydrological service, meteorological service and the beneficiaries in each country. The questionnaires for NMHSs included questions on institutional arrangements, human and financial resources and capacities, Hydromet networks, equipment and data collection, data systems and data sharing, service delivery and products and warnings produced. Beneficiary questionnaires were focused on receiving information on disasters, warnings on floods and droughts and stakeholder needs for that. The LCBC and GWP-CAF were the main facilitators in the field during this consultation process, working in close partnership with their Focal Points, the relevant line ministries and the WMO Permanent Representatives in the participating countries. The field activities were supported by social science experts and also drew on the role of traditional leaders and local administrations. Emphasis was placed on civil society organizations representing women, marginalized ethnic groups and vulnerable populations. In addition, stakeholders (local decision-makers, development and humanitarian agencies, private companies, etc.) from past and ongoing projects were regularly involved in consultative missions to develop necessary and sustainable synergies, assess gaps, share resources and understand the project's short and long-term impacts. In order to give all the populations of the Basin, especially women and youth, the opportunity to express their views on activities and expected results, the attention of the project partners in the countries was drawn to the need to cover not only all forms of water resources use in the Basin, but also to integrate/associate them in the people and groups surveyed. The same applied to the selection of participants in the regional workshops. To ensure that gender issues were properly addressed, a gender expert was also involved in the formulation of some of the project activities, in addition to the AF National Designated Authorities contribution. On the basis of the data and information received from countries through the questionnaires (in addition to the questionnaires completed by the countries' technical services, about 50 questionnaires were completed by the potential beneficiaries of the project activities in the Basin), documentation received, and online technical discussions, a draft project proposal was elaborated and submitted to the stakeholders for consideration and validation.

The first regional stakeholder workshop for the preparation of the project took place on 21 and 22 February 2022 in N'Djamena, Chad, organized in a hybrid format due to Covid-19, including both online and face-to-face participation. It gathered a total of seventy-five participants (25% women and 30% youth), 37 of whom were present in N'Djamena and 38 online. The participants were presenting all five member countries and including key stakeholders of the project.

The stakeholder workshop reports in English and French are available through [this link](#) and a short news coverage of the event was published at [WMO website](#) and on the [GWP website](#).

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This workshop aimed at collecting additional data and sharing information on the project with the main stakeholders of the Lake Chad Basin countries, such as national Hydrological Services (NHS), National Meteorological Services (NMS), institutions in charge of disaster management, regional organizations, NGOs and communities living in the basin. This workshop also aimed to create a common understanding and full picture of the objectives of the project and the associated benefits, but also of the implementation strategy by the national and regional institutions involved. This helped to create a solid platform for the development and successful implementation of the project at regional, national and community level.

As a result of the workshop, participants agreed that all project components are important and complementary, but if they were to be prioritized, Component 1 would come first because data collection infrastructure is essential to achieving the other outcomes. This would be followed by databases, data sharing and monitoring funding mechanisms; strengthening the technical and institutional capacity of NMHSs to monitor and store relevant and up-to-date data, and to develop products and provide services. Other points that were highlighted: Involvement of users such as farmers in field data collection; establishment of local community environmental monitoring committees and ensuring their supervision; going beyond data provision and offering products/services, including prevention of risks such as agricultural pests (caterpillars, locusts and migratory birds), waterborne and climate-sensitive diseases; establish a feedback mechanism for the verification of forecasts and alerts in order to continuously evaluate the systems in place and upgrade/update them, if necessary; communicating EWS in a simplified way that is easy to understand. For example, to install, among other things, at sensitive sites, a materialization of the alert levels on posts and boards with colored bands in green, yellow, orange and red, according to the nature of the hazard; taking into account civil society and water user groups and strengthening their capacities in understanding and interpreting warning messages related to climate risks; integration of communities and vulnerable populations, including women, youth and cultural aspects, in the whole process of the project to enable them to take ownership of the project while making them understand what their benefits are, and signing of a protocol of commitment of the countries to participate in the financing of hydrometeorological activities; use, among others, of social networks for information sharing and dissemination of warnings, including in local languages. Additionally, [a short case study](#) was made from the user need co-exploration, and lessons learned can be utilized in the further development of the project.

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In the process of preparing the full project proposal (from October 2022 to February 2023), an in-depth consultative process was carried out, at technical level through videoconferences with relevant stakeholders, and on Environment and Social Impact Assessment, and Gender aspects in the field. The technical consultations (whose summary is provided in **Annex 2**) allowed the confirmation of the baseline for each of the components as well as the identification of the priorities for each country. Stakeholder consultations with government entities, universities, projects, communities, development partners and non-government organizations (NGOs) were conducted in the field. These consultations allowed understanding their existing challenges and needs, presenting and collecting their opinions and comments on the project, as well as gathering suggestions and recommendations that could improve the environmental and social performance of the project, and gender equity. In particular, Technical Services in general stressed that their working conditions and lack of resources seriously hamper the accomplishment of their tasks, and therefore, welcome very much the proposed project.

Project activities were discussed with beneficiaries (including the most vulnerable groups – and taking into account the different needs and constraints of these groups). An extensive consultation process on environmental, social and gender issues was carried out in the five countries. Selection of the sites to be visited was based on: (i) representativeness of the problems related to the project (e.g. floods, drought, etc.) that exist in the 5 countries; (ii) security; (iii) accessibility, as some parts of the basin countries were flooded during the period of the year of the visits, and not reachable; (iv) ongoing activities of some elements of EWS in communities; and (v) technical considerations related to the installation of the hydromet stations and existence of stations in the villages. Visited sites are: Bol in Chad, Méri and Kousseri in Cameroon, Bossangoa in the Central African Republic, Diffa in Niger and Hadejia in Nigeria. These are not necessarily the sites to be used in the proposed project implementation, as the criteria will be further refined at the inception of the project, which include *inter alia* their representativeness for a regional/transboundary EWS, and the existence of damaged or manual stations. Therefore, no unidentified sub-projects (USP) will be in place under the proposed project. These visits allowed broad consultations with the local populations, the technical services, the administrative and traditional authorities. A detailed list of people met is provided in **Annex 3**. In summary, during the field consultation process, 192 people were people met, of which 46% are women. Online consultations were done with 17 people, of which 3 are female.

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All communities reported that climate change is a reality that disrupts their daily lives. They have indicated that floods are becoming more frequent and are causing significant damage and production cycles are disrupted. The populations also reported that they are witnesses of a changing world because the traditional knowledge that allowed them to empirically predict climatic-related events (rainfall, floods, locust attacks) is less reliable today. They must therefore

adopt new hydrometeorological observation approaches and rely on science-driven solutions like those proposed by this project.

From the consultation, it was also noted that conflicts between the different water users are accentuated due to floods. There are many conflicts among farmers-farmers, fishermen-fishermen, herders-herders, and farmer-herders. Most of the conflicts take place on the islands. On the other hand, the drying of the lake favors the rise of salt, thus the pH decreases, and the lands become less productive.

A final regional workshop to validate the project proposal was carried out from 29 to 31 March 2023. The report of this regional workshop is provided in **Annex 5**. Participants were organized in groups with the aim of gathering their views on the project proposal and highlighting aspects that needed further development. It was also an opportunity for stakeholders to express their ownership and commitment to the implementation of the project.

There was an active participation and a good understanding of the social, environmental and gender issues of Integrated Water Resources Management and Early Warning Systems by the various actors. The stakeholders met acknowledge the timeliness and importance of the proposed project and recognize that its objectives adequately meet the needs of the populations facing the effects of climate change. In fact, the project is considered by all stakeholders to promote hope for greater revitalization of development activities in the Lake Chad Basin. These stakeholders provided a number of recommendations to be taken into consideration in this project proposal and during implementation, including the involvement of stakeholders throughout the project cycle, the synergies between hydrological and meteorological services of the participating countries, the integration of gender and the consideration of vulnerable groups in particular in the design and implementation of EWS, the strengthening of collaboration with other projects and development partners intervening in the basin, and ensure as much as possible the participation of NGOs, local authorities, local institutions and users such as agricultural companies, civil society organizations, and local communities in the development of project activities, including data collection in the field. Participants also provided recommendations related to risks, sustainability and project management organization. All their recommendations and suggestions have been fully considered in the proposed project.

J. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Located in the Sahelian region at the southern edge of the Sahara Desert, Lake Chad belongs to the wetlands of the tropical world. It offers very rich ecosystems in an environment marked by aridity and is therefore included in the Ramsar list of wetlands of international importance as one of the few recognized transboundary international wetlands, where countries make a formal agreement for joint protection and management of shared aquatic ecosystems and their resources. For thousands of years, it has been a centre of development, trade, and cultural exchange between the populations of the northern Sahara and the south. Its watershed is nowadays confronted with the challenges of development, in the context of global warming and increasing demographic pressure. Indeed, climate change has severely affected the countries sharing the basin, characterized by recurrent large-scale drought, punctuated by extreme rainfall events that cause catastrophic flooding. This situation contributes to the precariousness of both rainfed crops and pastoral livestock, which are the two foundations of the regional economy. For example, the international disaster database [EM-DAT](#) indicates that over the past five decades, some fifty natural disasters linked to hydromet events have occurred in the Lake Chad Basin, affecting a total of more than 30 million people, including nearly four thousand deaths, with damage estimated at several tens of billions of dollars. Based on current experience, improved multi-hazard warning systems should contribute to a considerable reduction in these losses. Faced with this situation, the governments of the riparian countries have developed and implemented various strategies and action plans to reduce the vulnerability of populations and support their adaptation/resilience to the effects of climate change, particularly the risk factors that accompany it, with the support of technical and financial partners.

The actions to be undertaken to achieve this objective are part of the improvement of the governance of the basin's water resources and associated natural resources in order to preserve its productive potential. The LCBC is in charge of monitoring the basin and develops its capacity to mobilize, analyze and disseminate environmental information to be able to plan and enforce the sharing of the basin's water resources between member countries, the policy of protecting ecosystems, to promote informed decision-making, as well as steering and participation in public and environmental policies. From this point of view, the financing of the Adaptation Fund will make it possible to develop and complete existing projects, in accordance with the priority actions envisaged by the countries in the areas concerned, but also to support the LCBC in the development of its activities. The project will improve/modernize the information system in an appropriate and methodologically consistent manner for both water resources management and EWS, as well as for resilience measures and capacities to manage and reduce vulnerability to climate risks. An effective EWS is a key element of adaptation; WMO provides solution based on the latest generation of WIS (WMO Information System) and GDFPS (Global Data-Processing and Forecasting System) now on known as WMO Integrated Processing and Prediction System (WIPPS), thus Lake Chad would be one of the first answers to the call from UN SG on having EWS for all countries within 5 years. In addition, the various past and ongoing projects and initiatives bring different approaches and technologies, which require a significant level of effort and specialized expertise by LCBC and its Member States to

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operate and maintain. Often systems do not operate after project completion due to limited capacity to operate and maintain them, even if financial support is available for spare parts. The proposed AF funding under this project to LCBC institutional support will enable the establishment of interoperability of systems and harmonization of approaches for operation and maintenance, and the availability of a pool of experts that could assist any of the NMHSs in the Lake Chad Basin. Moreover, through the Innovation Calls supported by the proposed AF funding, it is expected that parts of the equipment be manufactured, and the interoperable/integrated system be developed within the region at lower costs. These aspects contribute to a reduction of operation and maintenance costs as expertise exist within the region and there will be no need to bring experts and equipment from abroad. Additionally, Countries will benefit from the overall, continuous capacity building program from the WMO Commission for Observation, Infrastructure and Information Systems (INFCOM).

The governance issues identified call for innovations and sustained efforts in their characterization for better management of water and associated natural resources at the basin level. This means improving monitoring and knowledge production systems and adequate services, but also ensuring that existing data is capitalized, mobilized and made available. For example, in order to be reliable and uncontested, the decisions to be made regarding the allocation of water resources between States, between upstream and downstream, and among uses, must be informed by quality data. With this in mind, the proposed project aims to contribute to adaptation strategies by investing in a combination of infrastructure and non-structural measures to improve preparedness, awareness of best practices and behavioral change among practitioners, policy makers and communities. It will also commit LCBC and the participating countries to long-term support and sustainability in the development of its activities, both in-country and at the regional level.

The total budget for the implementation of the six Components of the proposed project, including project management and execution, is \$10.755 million. The cost of implementing the six integrated Components is justified below.

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Table 15. Justification for additional funding by the AF.

Components	Baseline scenario (without AF funding)	Additionally (with AF funding)
<p>Component 1. Improvement of hydrological and meteorological observing system networks</p>	<p>The NMHSs of the LCBC member countries are poorly equipped and trained to document climate change and this is highly detrimental to good water resources management and planning for optimum mobilization of resources to satisfy all uses, as well as for the prevention of hydromet risks. Lacking Adaptation Fund resources, the station network is likely to remain insufficient and ineffective in providing the necessary data and information required to adopt a regional, integrated approach to building climate resilience.</p> <p>In addition, since early 1980s, budget cuts in almost all countries of the Lake Chad Basin have led to the abandonment of a large number of hydromet stations. NMHSs are facing problems of lack of financial, human and material resources to carry out their tasks properly. NMHSs also report vandalism problems (and security issues at the stations).</p>	<p>The AF will support the piloting and development of a number of activities necessary for the modernization and/or establishment of the hydromet observation network with about 50 observation stations (based on the WMO regulatory and guidance materials) in order to contribute to the improvement of hydrometric monitoring in the Lake Chad Basin. These activities, developed taking into account synergies with other projects, include among others: detailed analysis of the existing hydromet monitoring system, to determine the list of works and actions to be undertaken, including the use of new generation equipment, including satellite-based; inventory of available station equipment and determination of complementary equipment to be acquired (by adopting innovative technologies and techniques); rehabilitation/upgrading of old stations and installation of new stations.</p> <p>AF Funds will enable optimization of the regional network and bringing better coverage for creating products, services and warnings for population in the Lake Chad Basin. In addition, it will support an analysis of the organizational and institutional systems of NMHSs, including the existing legal basis and funding arrangements; the identification and recommendation of different models of financing hydromet monitoring (including involvement of private sector stakeholders, as appropriate) to build value chains for hydrological and weather information. Innovation Calls can be targeted e.g. to help with vandalism.</p>
<p>Component 2. Strengthening regional hydrometeorological information system (database and data sharing mechanism)</p>	<p>The available hydromet data at Basin level do not allow a consistent assessment of the temporal evolution, particularly following the drop in rainfall since the 1970s in the region (see Part 1). Without AF support, national and regional databases will experience lack of data, fragmented and uncoordinated water management/use. In addition, the lack of interoperability and automation between regional and national databases limit the capacity to develop adaptation interventions that build climate resilience.</p> <p>Appropriate data-sharing politics/agreements between countries and regional and international institutions exist but are not operationalized. Without such AF interventions, regional, basin-wide management will not be guided by quality data and information.</p>	<p>Support from the AF will enable the improvement of national and regional databases by assessing and controlling the quality of historical data in terms of availability, quality, gaps and completeness in existing databases and making them available to all potential users. A tailored regional database will enable centralization of on-time monitoring data as well as climate-risk data that will help in providing early warnings specially for drought and flood events.</p> <p>The implementation/improvement of the data exchange policy will contribute to an informed management of water resources for a better use by the users of the whole basin and for the prevention of risks related to severe hydromet events.</p> <p>Multilateral cooperation amongst participating countries is enhanced at various levels including at a producer level through interlinked throw sites that favors implementation of lessons learned within a regional network with potential to be share with others transboundary basins.</p>
<p>Component 3. Identification and development of hydrometeorological products and services</p>	<p>Challenges posed by the climate crisis are numerous in the Lake Chad Basin. The knowledge and infrastructure needs for understanding and managing the impacts of climate change on the Basin's populations, including food security and environmental, are important. At the moment, there is not enough understanding on this topic.</p> <p>Effective civil protection systems are built around a value chain that links monitoring (data collection systems) and modelling to concrete services provided to different socioeconomic sectors and populations. In the LCBC member countries, efforts made by governments have focused mainly on rescue, assistance, and rehabilitation</p>	<p>AF resources will be used to design a transboundary and integrated multi-hazard EWS, in a way that ensures that the system builds on existing national and transboundary policies and information needs, and contributes to enhance transboundary management. EWS will be an essential tool, giving policy makers and Basin's communities the required information to make preventative plans and adaptive livelihood strategies and implement them ahead of future hydromet events, helping to save lives and livelihoods.</p> <p>While noting that the five participating countries have been implementing some elements of EWS, there are no consolidated national and regional EWS in place. The AF support will allow the adequate and integrated management of hydromet events/disasters, such as floods and droughts.</p>

	<p>after disasters. National EWS mechanisms are unfortunately not very effective.</p> <p>New WMO initiatives such as the Global Hydrometry Support Facility (WMO HydroHub), which focuses on improving NMHSs hydrological monitoring for the effective delivery of hydrological services, should be leveraged. Without this proposed project, the dialogue between public and private sector will not necessarily take place.</p> <p>According to the Early Warning for All (EW4ALL, the UN Global Warning Initiative for the Implementation of Climate Adaptation) Action Plan for Pillar 2 (Observations and Forecasting) (WMO, 2023), observations and forecasts are the fuel that feeds the Early Warning Systems. Without this proposed project, the required capacity improvements in monitoring and forecasting will not necessarily take a place.</p> <p>While noting that the Lake Chad Basin is vulnerable to the effects of violent hydromet hazards, such floods (both fluvial and flash), droughts and sandstorms, forecasting tools and EWS within the riparian countries and coordination at regional level are yet to be improved. HydroSOS (Hydrological Status and Outlook System) is a WMO initiative that strengthens countries' capacities to monitor the status of water resources and produce seasonal outlooks, allowing stakeholders at the national level to assess and allocate their water resources. It allows, for example, farmers to know which crop to plant and when to irrigate. HydroSOS has entered its implementation phase and there is an opportunity to implement in the Lake Chad Basin region.</p>	<p>As part of the deployment of the WMO HydroHub, WMO is developing a number of activities to implement a new strategy for the development of hydromet monitoring activities in countries, including communication activities to raise awareness of the importance of hydrological monitoring among decision-makers and users of water information. The AF will support the development and implementation of project activities related to this initiative that will contribute to the improvement of NMHSs performance. There are no other alternatives to the development of the early warning system; developing EWS is a fundamental tool in disaster risk reduction. In the absence of the AF project, the climate-resilience of the basin communities will continue to be limited. The AF will support: (i) the detailed analysis of hydrological forecasting tools and EWS (floods and droughts) within the participating countries and at regional level, (ii) the determination of possible upgrades of the existing systems and mechanism for state-of-the-art EWS, (ii) undertaking the necessary data analyses for the determination of flood and drought risk thresholds for the different risk areas of the Lake Chad Basin, as well as environmental thresholds based on historical events in consultation with technical services and local representatives, and (iv) the development a flow forecasting information model for the Lake Chad Basin.</p> <p>In addition, it is thanks to funding from the AF that it will be possible to start implementing HydroSOS in the Lake Chad Basin. It will contribute to: (a) explore product development from hydromet information (in situ and remotely sensed) and global/regional models to provide a comprehensive overview of the state of the Basin's water resources as well as the hydrological outlook for the coming weeks and months; (b) update/set up a web portal to disseminate the HydroSOS products; and (c) sensitize and train NMHSs and national and regional research institutions to use information from Lake Chad Basin water resources.</p>
Component 4. Training of project stakeholders and knowledge development	<p>The Technical Services of the Lake Chad Basin countries are under-equipped (in terms of qualified personnel and infrastructure) for an adequate development of hydromet monitoring activities, but the situation is very variable from one country to another. One of the main problems facing by NMHSs in the region is the lack of a sufficient number of well-qualified staff for the proper development of activities.</p>	<p>AF resources will be used to: (i) improve collaborative interactions between key stakeholders in hydrometeorological activities in participating countries for more effective action; (ii) improve knowledge of the current situation and capacity needs of the main stakeholder groups to better meet their requirements; and (iii) improve efficiency of NMHS and LCBC staff in the development of their activities, including quality assurance and control, maintenance of equipment in accordance with WMO and safety standards as well as processing, data-sharing management, including WHOS, WIGOS and WIS tools. Responsible and effective data collection by monitoring station observers including prevention of vandalism, will also be supported.</p>
Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services (Communication and timely diffusion of appropriate	<p>Little or no interest by policy makers and water users in the development of hydrological activities in the countries is largely due to the lack or limited information on its importance for socio-economic development and risk prevention. One of the main reasons for the disinterest of decision-makers and water users is the lack of understanding of the added value that hydrological monitoring can bring to the development of their activities, to social wellbeing and to socio-economic development in general.</p> <p>Currently, there is limited stakeholder engagement in hydromet services and EWS, and no user feedback</p>	<p>AF resources will be used to: (i) raise awareness in order to secure sustainable hydromet monitoring activities and early warning systems in all countries of the Lake Chad Basin, allowing for an efficient and sustainable integrated approach to water resources management, climate change adaptation and risk prevention; (ii) improve user information through efficient and user-friendly channels, as well as appropriate language that allow greater added value in the development of their activities and better protection of life and property; (iii) implement and support institutionalization of user satisfaction surveys for continuous improvement of hydromet products and services made available to users; (iv) to support the establishment of early warning systems and disseminate EWS</p>

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<p>product and services to end users)</p>	<p>mechanisms in place. Hydromet information and warning messages are not disseminated through the most appropriate media and do not reach all sectors and society, including women, youth and vulnerable people. These messages are also not disseminated in an appropriate format and language to enable all sectors and society to clearly understand them and take action. In addition, there is no transboundary and integrated multi-hazard EWS in place, even if some elements of EWS target to specific sectors are in place. Further, there are no systematic approaches in place to ensure contingency measures at community level are in place.</p>	<p>information; (v) support contingency planning at the community level <u>in target locations.</u></p>
<p>Component 6. Plans and communities' response capacity</p>	<p>Governance systems are insufficiently developed. There is insufficient integration of flood and drought management and climate resilience in policies, plans, strategies and laws. Communities living in the basin are not able to develop information-based risk mitigation plans. Their climate resilience is limited due to their limited capacity to organize on the basis of reliable information to mitigate risks from natural disasters including floods and droughts. Without the Adaptation Fund project, communities will remain unable to develop the community-led and gender-responsive risk mitigation and climate resilience plans needed to make informed decisions in the event of hydromet hazards.</p>	<p>AF resources will be used to: (i) enhance the enabling environment and building up adaptation capacity of communities, which are critical to ensure resilience to climate risks; (ii) support enhancing governance mechanisms at the basin level and increasing adaptive capacity within the agricultural and natural resource sectors as well as disaster risk management, through the development and contribute to the institutionalization of plans, policies, strategies for integrated flood and drought management, risk mitigation and climate resilience at regional, basin and national levels; and (iii) support community level resilience, medium and long-term adaptation and mitigation measures in the pilot vulnerable areas, and create favorable conditions for upscaling of community plans to other geographical areas. <u>The plans to strengthen governance and climate resilience developed in this Component will allow the national (Output 6.1) and local (Output 6.2) levels to have favorable conditions to adapt to flooding and drought, which is aligned with Output Indicator 7.1 of the Adaptation Fund.</u> <u>As indicated above, AF funding will be used to start implementing HydroSOS in the Lake Chad Basin (Outcome 3.2), whose products will support real time assessment as well as flood forecasting and drought prediction in the Lake Chad Basin, which will improve planning and allow adaptation actions in various sectors, including in agriculture. Through Outcome 6.1, these new products will be used to support integrated flood and drought management strategies and plans, which will include specific adaptation measures to be taken by the communities, including on how to rationalize water, crop selection, and calendars, considering gender aspects. No paid services are envisaged at any stage of the development and implementation of the activities.</u></p>

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K. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project/programme.

The project proposal has been developed on a participatory basis, with the key partners and in consultation with potential beneficiaries. It is in line with one of the objectives of the LCBC Strategic Plan and falls within the area of inter-State collaboration in the management of the Basin resources. The participatory consultative process has ensured that the needs of the stakeholders are properly addressed. The populations of the Basin including the most vulnerable communities (adults, elderly, women and youth) have been involved in identifying their expectations and contributions to implement effective flood and drought management in the Basin.

The project sustainability aspects were discussed and underlined during the regional stakeholder workshops in February 2022 and in March 2023. Participants in these workshops agreed that the project is designed to ensure environmental, social, technological, institutional, and economic and financial sustainability dimensions as follows:

Environmental sustainability: The project interventions support environmental sustainability via the generation of critical data (through Component 1) and plans, policies and strategies (through Component 6) for the integrated management of floods and droughts and climate resilience.

Social sustainability: Social sustainability is ensured by developing skills (through all project Components), including gender considerations and maintaining close communication with local and national stakeholders (mainly in Components 5 and 6). A gender-responsive stakeholder engagement strategy and action plan will be developed for continuous engagements with key stakeholders, including Civil Society Organizations (CSOs), private sector, government departments and local community representatives. School learning and communication materials (including in local languages) will be developed for practitioners, policy makers, parliamentarians, women and youth, including videos, websites, brochures, radio announcements etc, in collaboration with national agencies. In addition, the project will create favorable conditions for upscaling of community-led and gender responsive risk mitigation and climate resilience plans to other geographical areas.

Technological sustainability: The development of the project promotes the use of well-established WMO programmes and standards (such as WHYCOS, WIGOS, WIS/WHOS, WIPPS (former GDPFS), etc.). It also builds on the lessons learned from previous projects and ongoing projects in the region. In addition, WMO has been working to build a new strategy for WHYCOS programme operation model that focuses on sustainability of hydrometeorological monitoring in countries and the sustainability of the achievements of supporting projects after their completion.

Institutional sustainability: The LCBC provides technical assistance and capacity building to member countries, as needed, to strengthen monitoring and forecasting activities, and LCBC and GWP-Caf will support the development of policies and plans for integrated flood and drought management and climate resilience.

The training programme (under all Components of the proposed project, with a special focus in Component 4), covering aspects such as hazard and risk mapping, water balance, hydrological outlook, community-based flood management, integrated drought management, end-to-end early warning systems for flood management, etc., will provide technical support and new decision support tools to the relevant services of the participating countries and those of the LCBC. The Technical Services of the participating countries will develop skills to create appropriate information products to efficiently manage the hydromet network, develop information products, and issue early warnings.

In particular, the priorities of the states and the needs of the basin's water users will be taken into account in a participatory approach by supporting the institutionalization of a user feedback mechanism. In addition, institutional and legal strengthening is envisaged, as well as improved national and regional coordination between the various actors. The project also includes communication activities such as: (a) raising the awareness of public authorities, including policy and decision makers, on the importance and economic value of hydrological monitoring for economic development and disaster protection; and (b) raising awareness among water resource users of the added value that hydrological monitoring can bring to their activities, in order to rise their interest and encourage them to contribute to its financing. These awareness-raising activities will be supported by the provision of good quality and timely hydrological products and services during and after the project lifetime. In order to better meet the needs of the users, NMHSs will develop methods and tools that will allow them to know the needs of the users and to measure, afterwards, the satisfaction of the users.

Under Component 4, there will be an enhancement of local training, by empower the NMHSs and LCBC staff through (1) training-of-trainers; and (2) re-training of existing staff, in order to build operational expertise related to hydrometric monitoring. This will build a pool of local experts that would support training of new/future NMHSs' staff and retrain existing staff but introducing the innovative technologies and methods.

Through Component 5, the proposed project will support awareness-raising and visibility, which are important for government, sectors and communities to understand the benefits of hydromet services. This will help integrate hydromet services into larger agendas in the countries, such as those related to climate change, disaster risk reduction, and socioeconomic growth, ensuring institutional sustainability.

Under Component 6, the project will support embedding of flood and drought management and climate resilience in governance systems. This will help establish a long-term favourable institutional environment to sustain hydromet services, EWS, and risk management.

Economic and financial sustainability: The Lake Chad project will contribute to a better management of the Basin's water and natural resources, and hence of all the economic development factors that constitute the economic lung of the region. In view of the potential impacts of climate change, which are likely to bring about irreversible changes in the Basin's natural resources, it is essential to document and improve knowledge of water resources and of climate evolution and risks, which are inseparable from any policy aimed at sustainable management. At the end of the activities covered by the proposal, an optimum network of monitoring stations as well as up-to-date and accessible databases and information systems will be set up and available in the countries and at the LCBC. Under Component 1, the 'Innovation Calls' for equipment will support locally self-manufactured and with a low total cost of ownership of the equipment, parts and systems, which will address a main issue for NMHSs regarding operation of the equipment and systems that are acquired abroad and stop to operate after the project lifetime, noting that their acquisition and maintenance are expensive, and developing countries cannot afford. Local private engagement will also contribute to sustainable investment. Under Component 1, there will also be the development of a strategy for sustainable management (operation and maintenance) of monitoring networks, and identification and recommendation of financing models of NMHSs, which will ensure economic and financial sustainability of the investments under this proposed project.

Under Component 5, there will be WMO HydroHub Ministerial Roundtables, which are physical high-level ministerial events hosted in one of the countries or at LCBC level, where each minister supervising meteorology and hydrology will make commitments on behalf of each country, both in terms of project implementation and long-term sustainability. At the same time, newsletters on the project proposal and implementation will also be issued and circulated periodically among relevant Ministries in order to keep them informed and up-to-date in relation to project requirements.

It should be noted that the LCBC, which will act as the Executing Entity of the project, has a long experience in managing international projects and already has strong collaborative relationships with NMHSs in its member countries. At this stage, co-financing of the proposed project consists only of in-kind contributions from the five participating countries with the staff time of the government institutions, as per the letters of support, to contribute to the financing of the hydromet monitoring activities and development of products. This contribution, minimal in the first year, will gradually increase until the last year of the development of the activities when it should reach, for each country, the equivalent of the annual cost of operation and maintenance of the stations of the hydrometric network located in the respective national portions of the Basin. Agreement letters will be signed between the countries and the project Executing Entity on the subject before the effective launch of the activities in the field. Such a contribution will ensure that follow-up activities will continue after the project on the basis of the participating countries' own funding. LCBC will also consider reviewing the MoUs with its Members States to strengthen them along current realities on data sharing, twinning on technical support and cooperation issues. In addition, the consolidation of the project's achievements will be ensured in the framework of the ongoing activities of the partner organizations (LCBC, GWP-Caf and WMO) for the benefit of the countries. Updates on this project will be featured in agenda items of the LCBC Heads of Government and Technical Meetings. Moreover, Chad and Niger are part of the initial selected countries benefiting from SOFF and EW4All.

In addition, a budget line has been created in the budget of the LCBC Basin Observatory Division, to support countries in the development of hydrometric activities on a minimum number of stations. This is confirmed in the LCBC annual work plan and by the LCBC Confirmation Letter. In order to ensure its sustainability, the stations of the EWS network that are not yet in this minimum number will be included. Letters of support for operation and maintenance engagement are collected from the participating countries. NMHSs will also ensure that budget lines

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with indicative items related to this project (such as visits to project sites, planning meetings, inspection of equipment, installation and maintenance costs) are included in the annual national budgets.

The proposed funding mobilized by countries in support of the hydromet monitoring activities and development of products will help the project sustainability, including through Output 1.2 activities as well as activity 5.1.1, in particular the Ministerial Roundtables that will contribute to secure future funding to support the project and associated O&M. In addition, the proposed project will also explore potential business relations with the private sector, in light of The Geneva Declaration, adopted by the WMO Congress in 2019, that supports the Public-Private-Engagement (PPE). Examples include the inclusion in the bidding documents for e.g. observation networks, the specifications for a public-private-partnership (PPP) where the firm will be responsible (as usual) for the supply, installation, testing and commissioning; and for assisting the NMHS in commercializing the data for specific sectors (e.g. dam (hydroelectric and hydroagricultural) and waterway managers, water supply utilities, etc.) against getting access to the data and sharing the revenues with the NMHSs. Other possible mechanism for the engagement with the private sector is through the licensing with an associated fee that the NMHS would receive in case a private company would like to provide hydromet services in the five participating countries supported by this proposed project. Finally, the proposed project will also establish links and synergies with other projects and financing mechanisms similar to the [Systematic Observations Financing Facility \(SOFF\)](#), the [Alliance for Hydromet Development](#), the [UN Initiative of Early Warnings for All \(EW4ALL\)](#) and other EWS funding mechanisms, for better integration of the activities and avoid overlaps, thereby contributing to reducing costs and ensuring long-term operation and maintenance.

The Excel file that describes the cost-benefit analysis and results, includes a calculation of the O&M costs from Year 2 onwards, which (based on international literature and other projects implemented in the region) is estimated to be 6% of the cumulative investments. It is noted that there is an increase from 114 901 USD in Year 2 to 637 200 in Year 6 (after project completion), covering O&M costs for the five countries and the regional structures. Sources of funding to cover the O&M costs have been identified above, including the in-kind contributions by the countries, the dedicated budget line at LCBC level, the PPE approaches, and the innovative approaches to manufacture parts of the equipment in the region in order to reduce costs.

L. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project/programme.

A detailed Environment and Social Impact Assessment (ESIA) was carried out and the report is provided in **Annex 3**. As part of this assessment, project activities have been screened for environmental and social risks in accordance with the 15 principles set out in the Adaptation Fund's Environmental and Social Policy. As indicated in **Table 16**, the principles were initially analyzed with the assistance of LCBC officials and participating countries, and subsequently were complemented by field visits.

The proposed project has been designed to reduce the chance of any environmental and social risk vis-à-vis the 15 principles as project implementation procedures are designed to avert any such risks, and are consistent with the environmental and social policy of the Adaptation Fund. Activities under Component 1 relating to the rehabilitation and installation of new stations are likely to generate negative impacts in terms of land acquisition, restriction of land use, involuntary resettlement and production of waste related to the use of batteries and replacement of sensors. The potential impacts associated with these activities are relatively low and can be managed without further assessment procedures. However, a waste and recycling plan will be developed as part of the operation and management strategy. In addition, deeds of land security will be acquired each time a new acquisition of land is made for the needs of the project. The prevailing insecurity in several areas of the Lake Chad Basin due to armed groups including Boko Haram presents risks for the populations and the workers of the project. There has been a lull in the last few months in the countries particularly affected (Nigeria, Niger and Chad), however the States must continue the security efforts put in place and the project must limit the movement of its workers to the safest areas.

Activities under Component 6, such as the development of community level plans are likely to generate negative impacts in case there is a need to implement infrastructure. However, the risks will be very limited and well managed because the development of these plans will be guided and reviewed by the Executing Entities, and focus will be put on nature-based solutions. In addition, the proposed project will not implement any infrastructure components; support to implementation would be limited to soft support, notably awareness-raising and capacity building of the communities so that they can take on implementation themselves.

It should also be noted that the possible triggering of a specific risk may lead to other risks. For example, the resettlement of displaced populations is a complex process involving many risks, including loss of land,

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employment, housing and access to common resources, economic marginalization, food insecurity, etc. This type of high-impact risk is not part of the proposed project, as the measures to be taken will focus on the principles of integrated water and environmental resource management and disaster risk reduction measures. However, the development of risk maps can alert national authorities and communities to sites potentially at-risk due to floods or droughts. Public authorities may then consider relocation or resettlement of the population, or people themselves may decide moving to safer locations in urban or rural areas. This can be considered as primary indirect risks. In addition, secondary or dependent risks, such as competition for water, land use (e.g., between pastoralists and farmers) and natural and food resources, as well as social and cultural conflicts with people in the new location, may pose a challenge to relocating families.

Public authorities and relevant national institutions need to be sensitized to such risks and their impacts. The proposed project will raise awareness and communicate these risks and potential mitigation measures with the prior informed consent of stakeholders (through Components 4 and 5). The relevant national authorities will be provided with decision support tools to develop and implement a resettlement plan that respects the rights and improves, or at least restores, the standard of living of those to be resettled because of extreme hydromet events. For safeguard actions, a set of standards or procedures will be made available, specifying the desired outcomes and specific requirements to be achieved by means appropriate to the nature and scale of the activity and proportionate to the level of environmental and social risks and/or impacts.

By improving accessibility to early warning, capacity and the knowledge base, the AF support for this proposed project will contribute to increasing the evidence base available for future initiatives to promote adaptation to climate change and improve water and environmental management, both at national and transboundary level.

Table 16. Screening of the environmental and social policy principles of the Adaptation Fund.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
<i>Compliance with the Law</i>	<p>No further assessment is required. The project will ensure that existing national and transboundary laws, policies and guidelines in the basin are respected when implementing adaptation measures or capacity development activities. The project will not require any prior legal and regulatory approvals for environmental and construction issues as no large physical or structural construction is foreseen in the development of the activities; it only considers small works for the new stations. However, the project must take safety measures for the movement of its workers in risk areas.</p> <p>If necessary, international laws on data sharing protocol between different countries will be consulted and lessons will be learnt for application in the proposed project.</p> <p>During the design of this project proposal, in particular the data collection and exchange component, the attention of regional and national stakeholders was drawn to the need to implement the recommendations of the Water Charter of the LCBC on hydrological monitoring and data sharing between member countries.</p>	<p>Risk: Low Potential Impact: Low</p> <p>Relevant national and local authorities have been consulted during the consultative process to ensure compliance with all relevant laws. Project activities will be implemented in alignment and compliance with national and international regulatory and policy frameworks signed by the participating countries.</p> <p>The prevailing insecurity in several areas of the Lake Chad Basin must lead the States and the project to take measures to ensure the safety of the populations and the project workers.</p>
<i>Access and Equity</i>	<p>No further assessment is required. The project will allow impartial and equitable access to the associated benefits. The project is designed to enable representatives of vulnerable groups to participate in all capacity building trainings/workshops. The selected participants will be expected to share the knowledge gained in the training with other members of the communities or organizations so that everyone has fair and equitable access to the full benefits of the project. The selection of beneficiaries will also be done in consultation with local practices and traditions. Pilot testing will ensure that all stakeholders, including vulnerable groups, are involved.</p>	<p>Risk: Low Potential Impact: Low</p> <p>However, the project foresees capacity building activities in which only a small percentage of communities will be able to participate. The project will ensure that these community representatives are future trainers who disseminate information to the wider groups. In this regard, training materials must be carefully prepared for targeted audiences to facilitate community representatives disseminate information for locals.</p> <p>In addition, the project will be advertised broadly through the mass media (radio, social media, town hall and village meetings, workshops etc.) to improve stakeholders' engagement.</p>

<i>Marginalized and Vulnerable Groups</i>	<p>No further evaluation is required. The project will contribute to the reduction of existing inequalities in EWS for floods and droughts, particularly those affecting marginalized or vulnerable groups dependent on agriculture or living in urban areas.</p> <p>A gender-responsive stakeholder engagement strategy will be developed and implemented under the project.</p> <p>Local community members will be provided with adequate information and explanation of the systems in order to use them for their own benefit.</p> <p>Community-based flood and drought management activities will support the participation of marginalized and vulnerable groups and their ownership of the benefits of the project.</p>	<p>Risk: Low Potential Impact: Low</p> <p>There is a risk that vulnerable and marginalized groups do not have sufficient knowledge and access to technological devices such as mobile phones or lack of good telephone connection especially required for access to information. The project is therefore designed to provide an equal share of benefits to vulnerable groups, such as women and youth. A gender action plan has been prepared to address barriers and meet needs of those groups. The project will empower vulnerable groups to make decisions on concrete adaptation actions, valuing their traditional and local knowledge, <u>especially through activities that engage marginalized and vulnerable groups, under Components 5 and 6, at no cost.</u></p> <p>In addition, to avoid the exclusion of marginalized and vulnerable communities, local radio channels and traditional practices such as the 'Arabic telephone' will be implemented to reach these groups, particularly women, girls, the elderly and people with disabilities.</p>
<i>Human Rights</i>	<p>No further assessment is required. The proposed activities do not or will not violate any of the established human rights.</p> <p>Furthermore, the proposed project will promote the basic human rights of access to water, food and information.</p> <p>The project will allow each person concerned to give their opinion, perceptions and needs to develop better adaptation measures to climate change.</p>	<p>Risk: Low Potential Impact: Low</p> <p>The prevalence of violence against women and girls is rooted in patriarchal and traditionalist communities. The project will mainstream training on Human Rights into all training activities.</p>
<i>Gender Equity and Women's Empowerment</i>	<p>No further assessment is required. A Gender Assessment has been carried out and an Action Plan developed in line with the Fund's Gender Policy (see Annex 4). The proposed project will improve gender equity and women's empowerment through a gender-responsive stakeholder engagement strategy and through a tool developed by WMO: <i>Training Manual for Gender Mainstreaming in End-to-End Early Warning System for Floods and Integrated Drought Management through a Participatory Design Approach</i>. This will increase the participation of women, girls and other vulnerable groups in flood and drought management activities and decision-making processes.</p>	<p>Risk: Medium Potential Impact: Medium</p> <p>The proposed project targets a region where men hold the majority of leadership positions. Women's participation in disaster preparedness and decision-making is often limited due to cultural and social norms. There is therefore a risk that women will not benefit equally from the proposed adaptation measures and capacity development interventions. The gender-responsive stakeholder engagement strategy included as one activity of this project will ensure that women and representatives of women's groups are fully involved.</p>
<i>Core Labor Rights</i>	<p>No further assessment is required. The project will be implemented and managed in accordance with the labor laws of the country concerned. No person will be employed without remuneration and this remuneration will be in accordance with the country's labor legislation/laws. Child labor will be prohibited and will not be accepted from project partner institutions.</p> <p>Local communities will be involved in the adaptation measures but will not be exposed to any risk of accidents. Core labor rights have been respected and taken into account in the design and implementation of project activities.</p>	<p>Risk: Low Potential Impact: Low</p> <p>In response to any risk of mistreatment or discrimination, the project will at all times ensure workers' rights are respected at all times and upheld to international and national labor laws and codes.</p>
<i>Indigenous Peoples</i>	<p>No further assessment is required. All population groups in the area will be consulted and involved during the design and implementation of the project activities. To be considered indigenous, people must meet all the following criteria: (i) self-identification; (ii) collective attachment to geographically distinct habitats; (iii) customary cultural economic, social or political institutions</p>	<p>Risk: Not Applicable (NA) Potential Impact: NA</p> <p>The traditional use of natural resources, the irrigation system and land use may be a challenge. Therefore, a detailed analysis will be carried out by local and national institutions during project implementation, in order to understand the traditional use of natural resources, especially with regard to water and land.</p>

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	<p>that are distinct or separate from those of the mainstream society; (iv) a distinct language or dialect, different from the official language or languages of the country or region in which they reside; (v) State recognition as an indigenous people. The project area of intervention does not contain indigenous people recognized as such by the governments of the five countries.</p> <p>However, it is recognized that the traditional knowledge of people on floods and droughts will be useful in the preparation of risk maps, early warnings and dissemination of information, and therefore considered in the proposed project.</p>	
<i>Involuntary Resettlement</i>	<p>No further assessment is required. No involuntary resettlement will result from proposed project activities. While not all sites for the proposed network of hydrometeorological stations have been identified at this stage, site selection will focus on the rehabilitation and modernization of existing, brownfield sites. On these sites, impacts to local communities will be limited to a short-term increase in traffic with limited and reversible adverse impacts. In the event that greenfield installations are required, environmental and social impacts will be limited to the short-term impacts of civic works. However, given the small footprint of proposed works and the pre-existing availability of public land available for project activities, these works will not result in involuntary resettlement. According to information collected on the ground from municipal authorities and National Meteorological Services, there are enough lands at their possession to meet the needs. In most countries in the region, the immediate river banks on which hydrometric stations are usually installed are part of the public domain of the State, by law.</p> <p>In addition, the locations for the new stations will be selected based in, <i>inter alia</i>, their representativeness for a regional/transboundary EWS, and the existence of damaged or manual stations (brownfield sites). The use of brownfield sites will ensure that there will be no lasting environmental and social impacts beyond short-term impacts related to the installation of new monitoring equipment. These impacts are likely to be short-term in nature and predominantly related to minor nuisances related to increased access requirements. The selection of sites will be informed by the ESP of the AF, and any sites (brownfield or not) that are likely to result in currently unforeseen severe adverse social or environmental impacts will be removed from consideration. Therefore, no unidentified sub-projects (USP) will be in place under the proposed project.</p>	<p>Risk: Medium Potential Impact: Medium</p> <p>However, indirect risks of population displacement after the mapping of flood and drought risk areas could be possible as some areas could be classified as high risk of loss of life. Based on scientific and factual information, public authorities institutions may then consider relocation or resettlement of the population, or people themselves may decide moving to safer locations.</p> <p>In addition, activities relating to the rehabilitation and installation of new stations (Component 1) are likely to generate negative impacts in terms of land acquisition, and restriction of land use. Nevertheless, the project will ensure that land belonging to private individuals will not be used, otherwise the affected people will be fairly compensated. According to information collected on the ground from municipal authorities and National Meteorological Services, there are enough lands at their possession to meet the needs. Even though the population displacement caused by floods or other climate-related disasters is not related to project activities, an integrated safeguarding approach will be defined to minimize the negative impacts.</p>
<i>Protection of Natural Habitats</i>	<p>No further assessment is required. There are no potential direct risks to the protection of ecosystems, their natural habitats and biological diversity through project activities. There is a possibility of indirect risks through community-level risk mitigation and climate resilience plans and revised national and transboundary policies and plans that could, if unguided, decrease the level of protection of</p>	<p>Risk: Low Potential Impact: Low</p> <p>Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition. The community-led risk mitigation and climate resilience plans will be guided and vetted by the</p>

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	critical habitats and health of ecosystems. Natural and nature-based solutions will be promoted using for example the World Wildlife Fund (WWF) Green Flood Guide , but will not be implemented during the project as it would require additional project activities and funding.	project team to ensure that they promote nature-based solutions and that they do not pose any risks to ecosystems. Support provided to implementation of the plans will be limited to soft measures and not hard infrastructures. Existing and new policies, plans and activities will be reviewed with stakeholders to ensure that critical habitats are protected. In addition, the activities concerned will take into account the characteristics of native species and critical values in defining environmental thresholds.
<i>Conservation of Biological Diversity</i>	No further assessment is required. There will be no direct risks associated with the conservation of biological diversity as the project will not involve any physical action on natural resources beyond construction of new stations, will promote nature-based solutions at community-level, and will not introduce any known invasive species. Some project activities will improve the understanding of natural processes related to the water cycle. Nevertheless, the project outputs (flood and drought risk maps, information on EWS) could lead to encroachment on protected areas, buffer zones and natural habitats.	Risk: Low Potential Impact: Low Lake Chad has at least 15 Ramsar sites with a total area of 168,753 km ² . The project activities will ensure that the principles of the Convention on Biological Diversity which has been signed by the participating countries are followed and supported. In addition, the countries' national biodiversity strategy and action plan will provide valuable information and methodologies, opportunities for information dissemination and coordination at national and transboundary levels. The project will promote the planning of biodiversity conservation activities, such as reforestation, nature-based solutions, through evaluation of pilot sites with relevant national institutions and communities. The project will promote capacity building and peer learning to strengthen the effective management of natural resources, including aquatic species, animals, and forests.
<i>Climate Change</i>	No further assessment is required. The project will not have any negative impact on climate change. It does not promote any drivers of climate change (emission of greenhouse gases, fossil fuels, transport, industry, building materials, large-scale pesticide use etc.) or deforestation. On the contrary, the project not only increases the flood and drought adaptive capacity and resilience of the local population, but also contributes to the development of a better governance structure, policies and plans at national and regional levels for climate change adaptation.	Risk: Low Potential Impact: Low The project seeks to enhance water resources management for better climate resilience of the population severely affected climate change. It will disseminate information among stakeholders and assess the impacts of climate change and future risks in different sectors (including for food security, water supply and environmental services). In addition, actions aimed at increasing the resilience of populations will be planned at the local level with a focus on nature-based solutions.
<i>Pollution Prevention and Resource Efficiency</i>	No further assessment is required. The project activities are not expected to result in water, air, and soil pollution.	Risk: Low Potential Impact: Low The project will build technical and organizational capacity for water efficiency at national and transboundary levels with clear guidelines, policies, and action plans. However, the production waste from the use of batteries at hydromet stations will need to be carefully managed.
<i>Public Health</i>	No further assessment is required. The project is not expected to have a negative impact on public health. On the contrary, it will contribute to preventing the population from natural disasters, improving incomes to access health services, etc. However, in the event of a climate-related disaster, the displacement of populations can be a source of epidemics due to the lack of hygiene.	The project will identify at-risk communities that are prone to flooding and sensitize them to best practices in health security through various capacity building activities. The project will promote the planning of a health surveillance programme to cope with disasters. The project will regularly promote, inform and sensitize the population on diseases related to stagnant water (malaria, typhoid fever, amebiasis, cholera, etc.).
<i>Physical and Cultural Heritage</i>	No further assessment is required. The project does not affect the physical and cultural heritage. The aim of the project is to develop better management of natural resources and to have traditional and cultural integration between people.	Risk: Low Potential Impact: Low A file for listing lake Chad as a UNESCO world heritage site has been under consideration since 2018. Insecurity concerns are believed to be behind the halt in the review process. The participatory design and mapping approach of the project will involve communities and local authorities to identify areas of physical and cultural

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		importance and ensure that community flood and drought management activities will not have a negative impact on them.
<i>Lands and Soil Conservation</i>	No further assessment is required. The project will promote the conservation of soil resources and land, including the selection of natural and environmentally friendly solutions.	Risk: Low Potential Impact: Low The project will contribute to improving the resilience of communities by providing hydrometeorological products and services adapted to the needs of farmers and agricultural technicians and by helping them identify solutions to increase their resilience, with a focus on nature-based solutions. The project will not intervene in the financing of agricultural investments likely to contribute to soil degradation.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project/programme management at the regional and national level, including coordination arrangements within countries and among them. Describe how the potential to partner with national institutions, and when possible, national implementing entities (NIEs), has been considered, and included in the management arrangements.

The AF will provide resources to the WMO as the project Implementing Entity (IE) to effectively mobilize the LCBC and GWP-CAf as Executing Entities (EE) for the activities. Roles and responsibilities are described below in **Table 17**.

Table 17. Roles and responsibilities of project Partners and other relevant entities.

Entity	Status	Project responsibilities
WMO	Implementing Entity (IE)	WMO is the Implementing Entity (IE) for the proposed project and will be responsible for overseeing the implementation, financial management, evaluation, reporting and closure of the activities under the project. WMO will monitor and supervise the execution of the project and ensure the proper management, application, and use of the AF funds by the Executing Entities. WMO will have the overall responsibility of the Project implementation and will ensure that the AF funds are utilized in accordance with the terms of the Agreement between the AF and WMO.
LCBC	Executing Entities (EE)	LCBC is one of the Executing Entities (EE) for the proposed project. LCBC will assume overall responsibility for the effective delivery of most project interventions in order to achieve the expected project outputs, especially under Components 1 to 4, and partly under Components 5 and 6. MoU will be signed with the relevant National Technical Services, as appropriate. As the regional implementing institution of the project, the LCBC will organize the development of field activities and host the regional database, through its Observatory. It will also ensure cross-border coordination of activities and links with national structures.
GWP-CAf	Executing Entities (EE)	GWP-CAf is the other Executing Entity (EE) for the proposed project. GWP-CAf will assume overall responsibility for the effective delivery of project interventions in order to achieve the expected project outputs, under Component 6 and partly under Component 5. MoU will be signed with the relevant National Technical Services, as appropriate. The representation of the GWP-CAf, through its Country Water Partnerships (CWP), will promote the integration of local communities and actors, while establishing links with national decision-makers.
National Technical Services, including NMHSs, Civil Protection Organizations, Environment and Natural Resources Institutions, Research	National Partners	The National Technical Services, including the National Meteorological Services (NMSs), National Hydrological Services (NHSs) and Civil Protection Organizations (CPOs), Environment and Natural Resources Institutions, Research Institutions and Academia of each participating country are the National Partners and beneficiaries of the proposed project. They will contribute to the effective implementation of activities at the national and sub-national levels, with the assistance of technical partners, including LCBC, GWP-CAf and WMO's technical units. The National Technical Services will not be mandated for the management of AF funds and all related procurement processes. Directors of NMSs, NHSs and CPOs will be members of the Project Steering Committee (PSC). Others will be invited as per the topics of discussion at the meeting.

Institutions and Academia		
Sub-national and local agencies, technical partners and NGOs	Sub-national Partners	Local agencies, technical partners, NGOs and users (such as agricultural companies, civil society organizations and local municipalities) of each participating country are the Sub-national Partners and beneficiaries of the proposed project. They will contribute to the effective implementation of activities at the local level and on the ground. The Sub-national Partners will not be mandated for the management of AF funds and all related procurement processes. They will be invited to the Project Steering Committee (PSC) meetings based on the agenda.
Local communities	Last-mile beneficiaries of the proposed project	Local communities will play a key role in ensuring project ownership, efficiency, participatory and demand-driven development of hydromet products and services, EWS, and risk mitigation and climate resilience measures.

A Project Management Unit (PMU) will be set up to support the development and implementation of the project activities, and to act as the Secretariat for the Technical Committee and the Project Steering Committee (PSC). The PMU will be hosted by LCBC, and will include two technical staffs to be recruited by/for the project. An additional staff will be recruited and placed at GWP-CAf. In addition, there will be a Regional Project Manager (RPM), who will be either placed at LCBC or under the WMO Regional Office for North, Central and West Africa (TBC when the project approved). The RPM should have strong technical expertise and capacity in the management of multi-country projects, and capable working in French and English. The RPM will be responsible for the overall project implementation and coordination at regional level. Amongst its mandate, the RPM will: i) lead and manage the PMU; ii) liaise with and report to project Partners (WMO, LCBC and GWP-CAf); iii) liaise and coordinate with the National Implementing Partners on specific interventions in each beneficiary country and/or at the regional level; iv) provide administrative and technical expertise; v) be responsible for the day-to-day implementation and management of the project, and vi) serve as the focal point for interactions between the project stakeholders and other partner organizations. In addition, every quarter, the PMU in collaboration with the knowledge management and communication experts' team, will be responsible to highlight good practices and/or lessons learned to be discussed during annual Project Steering Committee meetings.

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A Project Steering Committee (PSC) will be set up to oversee and validate the implementation of the project activities in line with the expected results. It will be composed of representatives of the project partners (LCBC, GWP-CAf, WMO), representatives of each participating country (including directors of the NMSS, NHSs and CPOs, designated national AF authorities, and representatives of Ministry of Finance from each of the participating countries), the LCBC Focal Points, and the representatives of the CWPs. Other national partners (e.g. research institutions and academia) will be invited depending of the agenda of the meeting. Other stakeholders and development partners' representatives (such as the Sahara and Sahel Observatory ([OSS](#)), [BGR](#), [AGRHYMET](#), [ADB](#), [UNESCO](#), [CILSS](#) and the French National Research Institute for Development ([IRD](#)), etc.) may be invited as per the agenda of the meetings, as observers and at no-cost, to identify common synergies and to develop and share resources for structural and non-structural climate change adaptation measures. The PSC will meet every year either face-to-face or virtually, preferably in conjunction with other activities for cost savings.

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A Technical Committee (at no-cost) will also be set up. It will be composed of representatives of the project partners (LCBC, GWP-CAf, WMO), the staff of the PMU, including the Regional Project Manager. The Technical Committee will be chaired by WMO and should meet virtually every 3 months and any other time, as required.

In the same vein, to facilitate and ensure the harmonization of the development of activities in the field, a national project management working group should be set up in each beneficiary country, bringing together under the responsibility of the LCBC Focal Point, all the contributors to the project activities in the country. User sector and climate change representatives may be invited as observers at no cost. Financing the functioning of such groups would be under activity budget lines that include national stakeholder consultations.

An illustration of the organization of the management structure of the project is presented in **Figure 7**.

The Lake Chad Basin project will benefit from WMO's feedback from its WHYCOS programme and in particular the Niger and Congo-HYCOS components which have experienced the participation of some Lake Chad Basin countries. It will also benefit from the knowledge base and network of partners (institutions involved in environmental issues, disaster risk reduction, capacity building, community aspects and research, NGOs, national services) of the two associated WMO/GWP programmes targeting integrated flood management (APFM) and integrated drought management (IDMP). In addition to their possible contributions to the advisory committee,

they will be contacted to participate in the specification of the requirements, or possibly in the development of part of the activities according to their area of expertise. Other WMO initiatives, such as the Global Framework for Climate Services (GFCS), the Climate Prediction and Adaptation Service (CPAS), the Flash Flood Guidance System (FFGS), the WMO HydroHub, WHOS, HydroSOS, WWDI will contribute to the activities and help to expand the scope of the project outputs.

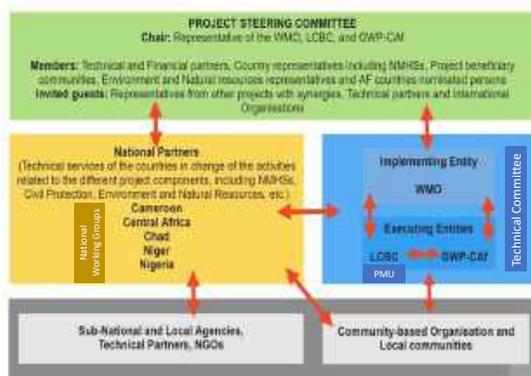


Figure 7. Organization of the management structure.

WMO will be involved at the monitoring and the supervision of the project, allowing for an international as well as a local presence. WMO Regional Office for North, Central and West Africa will support LCBC and GWP-CAF in coordination with national representatives of WMO (NMHSs) to strengthen regional cooperation. At the transboundary regional level, LCBC and GWP-CAF, alongside WMO, will ensure coordination and relations with institutions and stakeholders in the Basin.

The LCBC, which has a strong track record in this area, will organize the project activities at the regional level through the PMU. The PMU is the real linchpin of the coordination of the project activities carried out in and by the participating countries and in particular the NMSs and NHSs (NMHSs). It organizes the cooperation of NMHSs in the development of activities, centralizes the data collected by the project for the development, exchange and dissemination of regional information products. LCBC provides technical support to NMHSs during and after the project, along the entire value chain, from data collection to the development and dissemination of information products. In addition, GWP-CAF will particularly engage to support integration of flood and drought management in national level governance systems, and engagement with communities.

The LCBC will be assisted by technical partners, including GWP-CAF and WMO's technical expertise related to hydrology, hydrogeology, climatology, and meteorology as well as gender experts, throughout the life cycle of project.

Through its capillary network in the region among water practitioners, GWP-CAF will ensure a strong diversification of the partnership in the beneficiary countries and facilitate the organization of local activities. Its inclusion among the implementing entities will ensure a geographically wide distribution of project activities. GWP's network of national partners (several dozen linked to project activities) will disseminate and mainstream the project results at the local level.

At the level of the participating countries, the WMO can count on the support of the Permanent Representatives and the Hydrological Advisors, forming a technical assistance network to disseminate the project results to the Ministries in charge of Water Resources, Hydraulics, Environment and Civil Protection, but also at the international level in the [187 WMO Member States and 6 Member Territories](#).

Indeed, the achievement of the project's objectives implies actions at the level of the National Technical Services concerned in the participating countries. The contributions of the participating countries are therefore multifaceted and range from the provision of staff to the supply of equipment to complement that acquired under the project. On the other hand, old data records are provided by the latter. NMHSs have the competence and mandate

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to acquire, process and monitor these data. Each member country will provide the competent staff and other necessary resources required for the smooth running of the project and sustainability of the outcomes. In addition to these in-kind contributions, the project design also foresees that by the end of the implementation, countries will be in position to sustainably fund operation and maintenance either through their regular budget or by making partnerships with the regional and national companies. Such a development will also ensure that monitoring activities will continue after the project on the basis of the participating countries' own funding (see Part 2, section K).

B. Describe the measures for financial and project/programme risk management.

The framework conditions for the design of the project are based on the following assumptions:

1. The participating countries take ownership of the project and each accept:
 - responsibility for the maintenance and operation of the observation stations installed on their territory, including after the end of the project funding, and support the project with the staff of the relevant national technical services;
 - to formalize in an agreement, the free exchange of the data collected and the information produced.

It should be noted that the Water Charter of the LCBC, already ratified by four member countries and the process of entry into force of the Charter should be completed by early 2024, states that each country should ensure the collection and sharing of data on its national portion of the Basin. Given that the project development process is being launched following a request from the LCBC and the countries concerned, it can be said that this condition will be met. Nevertheless, if the Water Charter does not come into force before the date set for the start of project activities, the participating countries will be required to sign, prior to the launch of field activities, a specific agreement including the implementation of the measures specified in the Charter.

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2. The funds made available by the financial partners in the framework of the project represent only a one-off support for the development of hydromet monitoring and risk prevention activities, and the participating countries must make complementary financial contributions and ensure the consolidation/perpetuation of the achievements. The governments of the five countries will commit themselves to sustaining the financing of monitoring and risk prevention after the project. The choice of monitoring stations for the project is made in collaboration with NMHSs and users of hydromet products and services. On the other hand, due to the increasingly visible impacts of climate change, policy makers in countries as well as private development actors are becoming more sensitive to environmental monitoring issues. This proposal is designed to serve as a demonstration of the importance of state-of-the-art hydromet monitoring for socioeconomic development projects, risk prevention and resilience to the effects of climate change. In addition, funds will be allocated for awareness-raising activities among water stakeholders on these different topics to meet this requirement. The project will also directly work on strategies for sustainable financing of hydromet services. This also helps mitigate the risk that the monitoring and risk prevention measures would not be maintained over time.
3. The LCBC, which will coordinate the development of the project's activities in the field, with support of GWP-CAf, has a long experience in managing international projects and already has a strong and effective collaborative relationship with the participating countries. In addition, LCBC staff will benefit from the training organized under the project. The lessons learned by these staff will be used to help the countries consolidate and sustain the achievements of the project. Under these conditions, it is logical to assume that this condition will also be met.
4. The representatives of the National Technical Services (in particular, the NMHSs) who will have benefited from training within the framework of the project will be maintained in their posts throughout the duration of the project and afterwards to contribute to the development of activities in their respective countries. The existing institutional, legal and policy framework of NMHSs and the main challenges and gaps they face will be highlighted and will form the basis for the institutional capacity building actions recommended for the project, suggesting that this condition will also be met.

The WMO Secretariat, Technical Commissions, Regional Association I (Africa, RA I) Hydrology and Water Coordination Panel, and the RA I Committees on Infrastructure and on Services will provide support to the project

team and the LCBC to carry out regular risk monitoring. Similarly, project activities and recorded results will be monitored, evaluated, and reported in the WMO internal monitoring system by Monitoring, Evaluation, Risk and Performance Unit of WMO. Financial and project risk measures will be assessed as a continuous process throughout the development of the project activities. The potential risks identified are listed in **Table 18**.

Table 18. Project financial risks and possible mitigation measures

Risks	Rating	Risk Mitigation Measures
Inadequacies faced by national partners and LCBC in the area of institutional management	Low	Assess gaps and needs in the institutional, policy and legal framework and provide relevant support. Assess training needs and ensure targeted skills development; define a national and regional capacity building strategy. The LCBC has extensive experience in managing projects of this nature. The project will also recruit additional staff and use consultants to carry out some of the project's activities.
Lack of political and national commitment for funding O&M of project investments and delays in internal and external resource mobilization	Medium	Engage relevant government funding entities and private sectors using hydromet data early on; embed activities into LCBC regional and countries' national plans; identify synergies and linkages with planned and ongoing related programmes and engage potential funding entities early on in project formulation. Build awareness on the economic benefits of efficient monitoring and information delivery. Under the LCBC Water Charter, countries commit to monitor the water resources of the basin in their national portion of the basin and exchange data with the LCBC. The project therefore supports them in meeting these obligations.
Lack of human resources and skills to install and maintain the equipment, especially new generation equipment	Medium	Identify the difficulties of NMHSs and put in place the necessary technical assistance (LCBC expert or external consultant), provide capacity building (on-the-job training) to ensure support in the development of activities, and involve national technicians in the installation to ensure sustainability and capacity. Plan an appropriate training programme within the framework of the project for the capacity building of the staff concerned, including innovations.
Delays in procuring equipment through Partners; Equipment installed on the site by the project may be damaged or destroyed due to vandalism	Medium	Start preparing specifications early enough and plan the procurement timeline according to the entity policy. Take the likelihood of procurement delays and vandalism into account in the choice of equipment types and installation sites. Inform and sensitize the local population and authorities on the usefulness of this equipment for their own interests and for socio-economic development; use local observers as sentinels and as educators for local communities of importance of monitoring stations. Engage an observer or community information centres for each observation site to ensure the maintenance and guarding of the equipment. Make use of Innovation Calls to solve vandalism problem. Provide for the supply of spare parts and a contingency reserve, as far as possible with local companies.
Lack of cooperation between NMHSs and the Project Executing Entities, especially regarding data sharing or other technical aspects, equipment procurement, installation, etc.	Low/Medium	Make a project communication plan to get technical units involved and informed. Establish focal points and national coordination units, make sure roles are clarified in the start of the project. Provide for the signing of specific collaboration agreements between the Project Executing Entity and the NMHSs' supervisory ministries in the countries participating in the project activities; as well as MoUs to have focal points in the various agencies (NMS, NHS, DRM, etc.). There are multiple benefits accrued from cooperation and collaboration between the various agencies at both national and regional levels, which include shared infrastructure and information, improved services, improved visibility, etc. A framework for cooperation exists between the member countries of the LCBC since its creation in 1964. Furthermore, the Water Charter of the LCBC requires each country to organize hydrological monitoring in its national part of the Basin and requires the exchange of data between countries and with the regional basin management institution, the LCBC. This is in full agreement with the WMO Resolutions and Recommendations on the subject, in particular on data exchange. The LCBC can build on these elements to find a solution to the problem. Promote implementation of WMO Unified Data Policy approved by Cg-Ext-2021.
The technologies developed are not accepted by all groups in the community, including gender, age or minority aspects and this	Low	The project includes a socially inclusive and gender, age and minority responsive approach in all activities. Where necessary, non-technological or traditional methods will be adopted to reach and involve each group in the community. The project will also use local expertise and knowledge.

hinders equality (or technologies not suitable for the region)		Communities will be involved in the project and consulted. Make sure that innovations and technologies are suitable for local conditions.
The insecurity situation in the basin	High	The countries concerned and the international community are working hard to find a solution to the security problems as quickly as possible. An important project on the regional strategy for the stabilization, recovery and resilience of the Lake Chad Basin areas is currently being implemented by the LCBC. It should also be noted that those in charge of the technical services implementing the activities in the countries know the terrain well and can measure the nature of the danger and, like other LCBC projects under development in the basin, finding solutions to circumvent it. Furthermore, the insecurity in the Basin is at least partly due to tensions between communities. The easing of such tensions requires a better knowledge/control of resources and production systems which should favour a definition of documented rules, an efficient organization/planning and a better management of space for a more equitable access to the natural resources of the basin. The implementation of the proposed project activities will contribute to such a conciliation.
A new pandemic situation or a resurgence of the most recent one in the world (vs. Covid-19) effecting implementation of the project	Medium	Executing entities are situated locally in the region which helps the concerns on this aspect. The use of lessons learnt during the covid-19 pandemic and use of remote meetings for project steering committees in case of travels restrictions; establish digital collaboration platforms with communities.
Adverse hydromet effects or extreme hydromet events that could delay the implementation of the project	Medium	Ensure that hydromet information is communicated and correctly interpreted for local communities in and outside project sites. Work on the field will be planned to avoid the rainy season due to floods.

C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

A detailed Environment and Social Impact Assessment (ESIA) was carried out to examine the proposed project activities against the 15 principles of the Adaptation Fund's Environmental and Social Policy. The ESIA has also taken into account existing legislation or practices in the five countries participating in the project, as well as the cross-border provisions promoted by the LCBC on environmental and social issues, including gender. The project is categorized C, which indicates minimal or no adverse impact. This type of project is generally nonthreatening. However, a cross-analysis of the activities planned by the project and field surveys in the national portions of the Lake Chad Basin in the five countries made it possible to identify the positive and negative impacts of the project, and propose mitigation, compensation, or improvement measures according to the impact categories. The ESIA report is provided in **Annex 3**. The **Table 19** presents the identified risks and the mitigation measures.

Table 19. Identified risks and possible mitigation measures.

Checklist of environmental and social principles	Identified Risk	Level	Mitigation measures
1. Compliance with the Law	The project activities will be implemented in compliance with relevant laws, regulations and acts of the participating countries.	None	Project activities do not need mitigation measures since they generate no risks.
2. Access and Equity	There is a risk that all project stakeholders will not have equal access to project benefits.	Low	The stakeholder mobilization activities envisaged by the project will enable vulnerable groups to benefit from the project. The project will promote the equitable access to activities and assets by women, youth, elders and people with disabilities in targeted communities as well as equal and inclusive participation from both men and women in decision making processes.
3. Marginalized and Vulnerable Groups	Vulnerable groups, in particular people with disabilities, expressed during the consultations their fears of being excluded from the benefits of the project, if appropriate inclusion measures are not taken by the project.	Low	The project will empower marginalized and vulnerable groups to make decisions on concrete adaptation actions, while strengthening their skills.
4. Human Rights	Human Rights are inherent to everyone, regardless of gender,	Low	The project will mainstream training on Human Rights into all training activities.

	ethnicity, religion, and other status. All project activities will be implemented with strict respect for Human Rights.		
5. Gender Equity and Women's Empowerment	Due to their weak economic power and social prejudices, there is a risk that women will not participate in the same way as men in project activities.	Medium	The gender-responsive stakeholder engagement strategy included as one activity of this project will ensure that women and representatives of women's groups are fully involved. In addition, a gender plan has been prepared (Annex 4) to strengthen gender equality and project interventions will focus on promoting fair and equal development in the intervention areas.
6. Core Labor Rights	In response to any risk of mistreatment or discrimination, the project will at all times ensure workers' rights are respected at all times and upheld to international and national labor laws and codes.	Low	The project will respect all labor agreements and ensure that its workers are treated fairly, while guaranteeing them safe and healthy working conditions.
7. Indigenous People	The project area of intervention does not contain indigenous peoples recognized as such by the States.	None	Project activities do not need mitigation measures since they generate no risks.
8. Involuntary Resettlement	Activities relating to the rehabilitation and installation of new stations (Component 1) are likely to generate negative impacts in terms of land acquisition, restriction of land use, involuntary resettlement.	Medium	The project will ensure that land belonging to private individuals will not be used, otherwise the affected people will be fairly compensated. According to information collected on the ground from local authorities and NMHS, there are enough lands in their possession to meet the needs. It should be understood that population displacement caused by floods or other natural disasters is not related to project activities. In this case the government of each participating country should provide help and support to the displaced population.
9. Protection of Natural Habitats	The project will not intervene in protected areas or implement activities that could fragment ecological corridors as nesting, refuge, feeding or resting sites. However, there might be a low risk associated with the development of community plans.	Low	Guidelines will be issued on the preparation of the action plans to ensure that they do not include actions that could have some negative social or environmental impacts and the action plans will be vetted by the project team; the action plans will prioritize nature-based solutions; in addition, support to implementation will be limited to soft support to assist the communities in advancing towards implementation and no hard infrastructure investment will be supported.
10. Conservation of Biological Diversity	The project will not intervene in protected sites and will aim to preserve biodiversity through better management of water resources.	None	Project activities do not need mitigation measures since they generate no risks.
11. Climate Change	The project will not have any negative impact on climate change. The project does not promote any drivers of climate change. However, there might be a low to medium risk associated with: (a) The results or outcomes (false alarm or not sufficiently accurate warnings) of the proposed activity might occur after floods or drought events, and therefore, citizens and stakeholders will show less	Low to Medium	(a) Stakeholders and citizens will be consulted and provided with the short and long-term benefits of the project activities and with highlights of the lesson learnt and the ways in which it could be improved over the time; (b) The project partners will ensure the stakeholders are involved into coordination at all levels; (c) The data availability will be ensured through the involvement of stakeholders and communities, and through building synergies with the ongoing and future national and international projects (see list in Part II, section K.) on floods and drought management;

	<p>preparedness and interest in future events;</p> <p>(b) The lack of coordination between various stakeholders at different levels in flood or drought management, and therefore, the potential benefits of project activities will be lower than expected;</p> <p>(c) Insufficient data on areas at risk of flooding or drought, and therefore, citizens and stakeholders will show less preparedness;</p> <p>(d) The multiple recurrence of flood or drought events in some areas of the Basin, and therefore, project activities will be hampered due to the involvement of stakeholders in response and recovery activities.</p>		(d) The project partners will provide support to manage and collect all the new information for drafting the (Return of Experience) report.
12. Pollution Prevention and Resource Efficiency	The project will not pose any risks to resource efficiency or pollution for water, land or and other environmental components. However, there might be a low risk associated with the development of community plans and the production waste from the use of batteries at hydromet stations.	Low	Guidelines will be issued on the preparation of the action plans as described under item 9. above. In addition, production waste from the use of batteries at hydromet stations will need to be carefully managed and therefore, guidelines and plan on management of waste will be developed and implemented during the project.
13. Public Health	The project is aiming at reducing climate vulnerabilities and increase coping capacities of targeted communities through a climate risk management integrated approach. There is no risk that the project will cause public health issues.	None	Project activities do not need mitigation measures since they generate no risks.
14. Physical and Cultural Heritage	The project does not involve activities likely to affect Physical and Cultural Heritage. However, there might be a low risk associated with the development of community plans.	Low	Guidelines will be issued on the preparation of the action plans as described under item 9. above.
15. Land and Soil Conservation	The project will not have negative impacts on lands and soil conservation. However, there might be a low risk associated with the development of community plans.	Low	Guidelines will be issued on the preparation of the action plans as described under item 9. above.

Table 20. Responsibility for Actors for Environmental and Social Risks monitoring for project and sub-project activities as well as for implementing adequate measures through ESRMP.

Actor involved	Responsibility/Assignments for risks identification and monitoring under project/sub-project activities	Supporting Entity	Responsibility/Assignments for implementing measures
PMU, with the support of project Partners	<p>Development of Environment and Social Management systems (ESMS) comprising:</p> <p>(i) Identification (screening of compliance with ESP of AF and national laws) environment and social risks for the sub-project activities;</p> <p>(ii) preparation of ESIA and ESRMP for the sub-projects prior to the start of the sub-projects activities; and,</p> <p>(iii) regular monitoring and dissemination of the ESIA and ESRMP (with grievance mechanism) for the sub-projects and projects.</p>	<p>- Executing Entities</p> <p>- External consultant</p> <p>- National Environment and Social agencies in each country</p>	<p>- Ensure safeguard action are defined in compliance with the national regulations and implemented for the activities which can create social and environmental risks</p> <p>- Supervise the implementation of the response activities under the ESRMP in coordination with the bodies responsible for the management of water, environment and social welfare of each country</p> <p>- Monitor the progress of the risks minimizing actions or measures with the executing partners</p>

			- Carry out further assessment for the risks which have been encountered to avoid similar cases in other activities
Project Partners	- Support for the study - Contact lists of people to consult for ESIA in the countries - Inception and validation meeting of the ESIA report - Distribution and awareness of the ESIA and ESRMP report to the stakeholders	- Executing Entities - National Environment and Social agencies in each country	- Follow-up of the study and implementation of the activities of the ESRMP in relation to the bodies responsible for the management of water and environment of each country - Monitor the progress of the risks minimizing actions and measures with the help of checklists or consultation
National Partners	- Provide support for the study - Divulge information on the potential risks which could result - Inception and validation of the ESIA report	- Executing Entities - External consultant	- Identify potential risks which could result from the activities at the very initial stages especially at the design or planning stage - Monitor the implementation of the activities during and after the completion - Implement supportive actions to the populations in order to leverage the impact
Sub-national Partners	- Provide support for the study - Contribution to identification of the safeguard action through evidence-based knowledge - Divulge information on the potential risks which could result	- Executing Entities - External consultant	- Implement supportive actions to the populations in order to leverage the impact

Grievance Mechanism

The Grievance mechanism will be developed (check under ESRMP in **Annex 3**) for the beneficiaries of the project to address or report any complaints or discrimination directly to the Designated Authorities, Implementing Entity (WMO) and Funding Agency (Adaptation Fund). This Grievance mechanism was prepared based on the field consultations and taking into account the related activities in the Implementing Entity (WMO). There are several means (using emails, social media or through posts and regular mail) through which one can report the concerns they may have or find during activity design and implementation, or any suggestion for improvement. A dedicated telephone number will be available in each country so that the concerns are reported anytime and can be addressed in a short time. In addition, complaints/grievances books will be provided at the level of the focal point of LCBC, GWP-CAf, the main towns of rural communities, the sub-division, division office. At the end of every activity, there will be a feedback mechanism through short survey questionnaire to receive comments or suggestions from the participants (individually or in groups) to improve the shortcomings in future activities. The response and feedback to any concerns will be carried out in a transparent and effective manner, making sure that the identity of the person will be kept confidential, if requested.

These grievance mechanisms will be made available to all communities (or additional mechanism will be identified during the implementation of the project) specially to consider the special needs of different groups as well as have gender sensitive approach in the project area.

At the Implementing Entity level, the grievance mechanism will be regularly monitored for the complaints from the beneficiaries or stakeholders who will share their feedbacks directly through regular mail, phone, fax or email using the below details.

World Meteorological Organization

7bis, avenue de la Paix
Case Postale No. 2300
CH-1211 Geneva 2, Switzerland
Tel.: + 41 (0) 22 730 81 11
Fax: + 41 (0) 22 730 81 81
E-mail: wmo@wmo.int

Furthermore, there are two online forms, available at <https://public.wmo.int/en/about-us/contact-us> and at <https://public.wmo.int/en/about-us/planning-finance-accountability/internal-oversight-office/report-fraud-corruption-or-abuse>, that can be filled in for reporting and to receive prompt action or fulfil the needs of the beneficiaries.

The complaints can also be directly submitted to the secretariat of the Adaptation Fund at the following address:

Adaptation Fund Secretariat/Board
 c/o Global Environment Facility
 MSN P-4-400 1818 H Street NW Washington DC 20433 USA
 Tel: +1.202.478.7347
 Fax: +1.202.522.3240
 Email: afbsec@adaptation-fund.org

The complaints reported or received will be handled by the project management unit, who will investigate firstly through an on-site visit (if needed). The visiting team may invite other relevant agencies (local/national/transboundary) to participate in the investigation. During the investigation, the root causes of the risks or issues will be identified and the concerned individuals or agencies responsible for correcting or resolving the issue will be assigned. The team will produce a report of its findings such as causes of issues, involvement of concern agencies, time taken to resolve, recommendations and actions. Complainants may request or will be sent a copy of the reports related to the complaint. All the complaints (if received any) and measures taken will be stored in an archive of the project management unit and will also be reported to the Adaptation Fund along with the yearly progress report.

D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

Monitoring and evaluation measure the progress and overall impact of project activities through developed key performance indicators for all the key aspects of the project including gender equality and social inclusion. The programme of actions to be carried out within the framework of the project will include a list of indicators of achievement of these actions as well as the means of verification.

Monitoring and Evaluation arrangements for Project Activities

Monitoring and Evaluation (M&E) arrangements for project activities at local, national, and regional levels, including responsible actors are provided in **Table 21**. These arrangements will support the Project Steering Committee in implementing and adjusting the project activities, as appropriate. The M&E system will be based on a gender disaggregated data collection (wherein the baseline and target to be achieved are defined in the Results Framework of the Project – see Part 3, section E. below) and reported against each project Component, Outcome and Output.

Table 21. M&E arrangements for project activities at local, national, and regional levels, including responsible actors.

Institutional level	By whom / responsible actors	Baseline	Key Performance Indicator (KPI) (with gender disaggregation)	Target (based on project results framework / logframe in section III.E.)	End-result and means of verification
Local level M&E activities	Project Manager, local staff of NMHSs, Water Resources Units, DRM agencies, National External M&E expert	Baseline on the % of the hydrometeorological events forecasted with sufficient leadtime to allow that preparedness measures are taken by the communities, to be established on the first year of the project, taking into consideration the events in the last 3 years Limited preparedness and response capability to act upon warning and risk information	Percentage (%) of improvement in populations' resilience to floods and drought events forecasted with sufficient leadtime to allow that preparedness measures are taken by the communities Number (#) of people benefit from warning and risk information [both direct and indirect beneficiaries] (of which 30% are women) Number (#) of people benefiting from the risk	Additional 20% to the Baseline of the hydrometeorological events forecasted with sufficient leadtime during the last 3 years of the project, to allow that preparedness measures are taken by the communities At least 22.5 million people benefit from the transboundary and integrated multi-hazard EWS [both direct and indirect beneficiaries] (of which at least 30% are women)	Updated M&E checklists with the local project progress reports through interviews and target groups discussions, field visits, consultations and activity reports

		Limited communities' response capacity	mitigation and climate resilience plans in the communities [both direct and indirect beneficiaries] (of which 30% are women)	At least 2500 people benefiting from the risk mitigation and climate resilience plans in the communities [both direct and indirect beneficiaries] (of which 30% are women)	
National level M&E activities	Project Manager, local staff of NMHSs, Water Resources Units, DRM agencies, International External M&E expert	<p>Limited capabilities for detection and monitoring of hydrometeorological events</p> <p>Shortage of hydrometeorological infrastructure and resources</p> <p>Baseline on the % of the hydrometeorological events detected and monitored to be established on the first year of the project, taking into consideration the events in the last 3 years</p> <p>Limited institutional and human capacities at regional and national levels</p> <p>Limited communication and awareness campaigns</p> <p>Flood and drought events/disasters without adequate and integrated management</p> <p>Baseline on the % of the hydrometeorological events forecasted with sufficient leadtime to allow that preparedness measures are taken by the communities, to be established on the first year of the project, taking into consideration the events in the last 3 years</p>	<p>Percentage (%) of the extreme-hydrometeorological events (floods and droughts) detected and monitored</p> <p>Number (#) of regional and national trainings</p> <p>Number (#) of communication and awareness campaigns</p> <p>Percentage (%) of improvement in populations' resilience to floods and drought events forecasted with sufficient leadtime to allow that preparedness measures are taken by the communities</p>	<p>Additional 20% to the Baseline of the hydrometeorological events detected and monitored adequately during the last 3 years of the project, in order to allow that preparedness measures are taken by the communities</p> <p>Relevant NMHSs and LCBC staff trained</p> <p>At least 2 communication and awareness campaigns in place (e.g. WMO HydroHub Ministerial Roundtables; and user feedback mechanism)</p> <p>Additional 20% to the Baseline of the hydrometeorological events forecasted with sufficient leadtime during the last 3 years of the project, to allow that preparedness measures are taken by the communities</p>	National project progress reports, interviews and target groups discussions, field visits, consultation, hardware and software procured, installed or developed (reports of the tests) and activity reports

Regional level M&E activities	Project Coordinator, Project Manager, Directors of NMHSs, Water Resources Units, DRM agencies, Members of the Project Steering Committee, International External M&E expert	<p>Lake Chad Information System (database and data sharing mechanism) in place; but with limited operation due to lack of interoperability with national databases or processes for automatic transfer of data from national to regional databases</p> <p>Limited institutional and human capacities at regional and national levels</p> <p>Inexistent or inappropriate capacity development and human resources plans</p> <p>Flood and drought events/disasters without adequate and integrated management</p> <p>No transboundary and integrated multi-hazard EWS in place; some elements of EWS target to specific sectors are in place</p> <p>Limited preparedness and response capability to act upon warning and risk information</p>	<p>Regional hydrometeorological information system (database and data sharing mechanism) fed with data from the 5 countries in [near] real time [Yes/No]</p> <p>Number (#) of regional and national trainings</p> <p>Organizational reform strategy prepared [Yes/No]</p> <p>Percentage (%) of improvement in populations' resilience to floods and drought events forecasted with sufficient leadtime to allow that preparedness measures are taken by the communities</p> <p>Transboundary and integrated multi-hazard EWS [Yes/No]</p> <p>Number (#) of people benefit from warning and risk information [both direct and indirect beneficiaries] (of which 30% are women)</p>	<p>Regional hydrometeorological information system (database and data sharing mechanism) fed with data from the 5 countries in [near] real time</p> <p>Relevant NMHSs and LCBC staff trained</p> <p>Recommendations and a proposal for institutional reform with an action plan developed</p> <p>Transboundary and integrated multi-hazard EWS are in place</p> <p>At least 22.5 million people benefit from the transboundary and integrated multi-hazard EWS [both direct and indirect beneficiaries] (of which at least 30% are women)</p>	<p>Regional project progress reports, interviews and target groups discussions, field visits, consultation, hardware and software procured, installed or developed (reports of the tests) and activity reports</p>
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Monitoring and Evaluation arrangements for Project Management

The Project Management Unit (PMU) will be made available with monitoring and evaluation tools of project activities and resources. The PMU under the Implementing agencies will ensure that the Executing agencies have adequate resources and capacity to measure and monitor results at the local, national and regional level. The quarterly monitoring and annual evaluation reports of the Executing agencies along with the financial statements and resource management will be submitted to the Implementing agencies and further to the Adaptation Fund Secretariat for the review (**Table 21**).

Baseline Report: The project will conduct a baseline assessment, including a full stakeholders' mapping to ensure that any projects, programmes or other initiatives, or stakeholders that may be critical to project success, are captured and incorporated into the plan for project implementation.

Quarterly report: Monitoring will be carried out after each trimester and reports will be prepared with key results achieved, issues encountered or potential problems and proposed solutions.

Annual Report: Annual report will be prepared to monitor the progress in the time period of twelve months. This will be useful to monitor progress made in different activities. The annual report will be presented by the programme leader to the Steering committee to assess the overall progress and provide their suggestions or feedback.

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Mid-term Assessment Report: The project will conduct the mid-term review after two years of kick-off to get the feedback of external experts. Adjustments and/or reorientations of certain activities will then be made if necessary.

Final Evaluation or Project Termination Report: Two months prior to the completion of the project, an independent evaluation will be conducted to check the overall impact of the project. The final evaluation report will be developed and presented to the Adaptation Fund secretariat, project steering committee and other stakeholders.

Table 22. Monitoring and evaluation activities (Budget estimates are provided in Part 3, section G., Table 26)

Monitoring & Evaluation Activity List	Calendar Year																			
	Year 1				Year 2				Year 3				Year 4				Year 5			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Design, development and review of Monitoring & Evaluation tools	■																			
Monitoring the programme activities and outputs		■		■		■		■		■		■		■		■		■		■
Monitoring the activities and reporting the programme outputs			■			■		■		■		■		■		■		■		■
Mid-term Evaluation										■										
Improvement or additional changes in Evaluation tool											■									
Final evaluation																				■
Final Project Audit																				■

E. Include a results framework for the project/programme proposal, including milestones, targets and indicators.

Table 23 provides the results framework for the overall project at the Component impact level, while **Table 24** provides the detailed results framework of the project, which defines the key performance indicators and means of verification for each component, outcome, output, and activity.

Table 23. Results framework for the overall project at the Component impact level

Project Component	Project Results Framework					
	Project/ Component Impact Indicator, with Gender disaggregation	Scope of Works	Baseline (2022), with Gender disaggregation	Target Achievements, with Gender disaggregation	Means/ Methods of Verification	Assumptions
Project Impact/ Objectives: Increased resilience of the population living in the Lake Chad basin by enhancing the countries capability to manage and adapt to climate-related risks through improvement of hydrometeorological monitoring, data systems and service delivery and awareness on climate-related hazards						
Component 1. Improvement of hydrological and meteorological observing systems networks	Percentage (%) of the hydrometeorological events detected and monitored <u>Number (#) of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated</u>	Field visits; desk review studies; finding information from existing reports and documents; analytic work; acquisition and installation of stations; <u>development of innovative solutions;</u> discussions with relevant agencies and stakeholders	Limited capabilities for detection and monitoring of hydrometeorological events Shortage of hydrometeorological infrastructure and resources Baseline on the % of the hydrometeorological events detected and monitored to be established on the first year of the project, taking into consideration the events in the last 3 years <u>Only traditional approaches in place</u>	Additional 20% to the Baseline of the hydrometeorological events detected and monitored adequately during the last 3 years of the project, in order to allow that preparedness measures are taken by the communities <u>At least 1 innovative solution in place</u>	Field visit reports Factory Acceptance Test (FAT), Site Acceptance Test (SAT), and Operational Test (OT) reports for the stations Monitoring and Evaluation Reports Training reports and participant lists Legal framework documents Innovation Calls Announcements and Reports	Government support; strong involvement and ownership of key actors (No big governmental changes) Availability of resources (information, infrastructure, human, etc.) Security situation at the stations stable
Component 2. Strengthening regional hydrometeorological information systems	Regional hydrometeorological information system (database and data sharing mechanism) fed with data from the 5 countries in [near] real time [Yes/No]	Field visits; desk review studies; acquisition of hardware and software; training sessions and guidance materials	Lake Chad Information System (database and data sharing mechanism) in place; but with limited operation due to lack of interoperability with national databases or processes for automatic transfer of data from national to regional databases	Regional hydrometeorological information system (database and data sharing mechanism) fed with data from the 5 countries in [near] real time	Monitoring and Evaluation Reports Operational Test (OT) reports Progress reports Data-sharing agreements operationalized and institutionalized Data from countries shown online in the Lake Chad Information System (LIS) National and regional systems interoperable	Political conditions of the 5 countries and support for the transboundary organization (LCBC) Beneficiaries will implement techniques and tools that are well developed and applied in other regions Active involvement of stakeholders and availability of data/information
Component 3. Identification of user needs and development of hydrometeorological products and services	Percentage (%) of improvement in populations' resilience to floods and drought events forecasted with sufficient leadtime to	Regional and national workshops; Discussions with relevant agencies and stakeholders; Analytical work;	Flood and drought events/disasters without adequate and integrated management	Additional 20% to the Baseline of the hydrometeorological events forecasted with sufficient leadtime during the last 3 years	Monitoring and Evaluation Reports Training reports and participant lists	Government support; strong involvement and ownership of key actors and stakeholders in use of products

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	allow that preparedness measures are taken by the communities	Training sessions and materials	Baseline on the % of the hydrometeorological events forecasted with sufficient leadtime to allow that preparedness measures are taken by the communities, to be established on the first year of the project, taking into consideration the events in the last 3 years	of the project, to allow that preparedness measures are taken by the communities	Reports of the regional consultation workshops; and reports of the analysis Document describing the transboundary and integrated multi-hazard EWS Documents describing the new products and verification results of their application to the Lake Chad Basin	Availability of resources (information, infrastructure, human, etc.)
Component 4. Training of project stakeholders and knowledge development	Number (#) of relevant NMHSs and LCBC staff with demonstrably enhanced capacity (% of women) Organizational reform strategy prepared [Yes/No]	Regional and national workshops; Training sessions and materials	Limited institutional and human capacities at regional and national levels Inexistent or inappropriate capacity development and human resources plans	Relevant NMHSs and LCBC staff with demonstrably enhanced capacity Recommendations and a proposal for institutional reform with an action plan developed	Reports of regional and national trainings, list of participants Post-training surveys Organizational reform strategy	Government support; strong involvement and ownership of key actors Turnover of trained staff is not expected
Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services, and communication and timely diffusion of appropriate product and services to end users	Number (#) of communication and awareness campaigns Number (#) of early warning systems (by scale) and number (#) of beneficiaries covered [both direct and indirect beneficiaries] (of which 30% are women) Transboundary and integrated multi-hazard EWS [Yes/No]	Consultative meetings with relevant stakeholders and Ministerial Roundtables; Call interviews; Website/Local workshops; Training sessions and materials; Engagement of NGO working at local level	Limited communication and awareness campaigns Limited preparedness and response capability to act upon warning and risk information No transboundary and integrated multi-hazard EWS in place; some elements of EWS target to specific sectors are in place	At least 2 communication and awareness campaigns in place (e.g. WMO HydroHub Ministerial Roundtables; and user feedback mechanism) At least 1 transboundary and integrated multi-hazard EWS in place, and at least 22.5 million beneficiaries covered, [both direct and indirect beneficiaries] (of which at least 30% are women) Transboundary and integrated multi-hazard EWS are in place	Consultation meeting reports; training session reports and materials; and lists of participants Monitoring and evaluation report Quarterly reports of the NGOs that support the implementation of the plans Success stories from pilot testing Multi-channel awareness raising and user feedback mechanisms Cost-Benefit Analysis (CBA) documents	The political and security situation remains stable Government support and communities' commitment; strong involvement and ownership of key actors
Component 6. Plans and communities' response capacity	Number (#) of people benefiting from the risk mitigation and climate resilience plans in the communities [both direct and indirect beneficiaries] (of which 30% are women)	National and local workshops; Consultative meetings with relevant stakeholders; Analytical work; Training sessions and materials	Limited communities' response capacity	At least 2500 people benefiting from the risk mitigation and climate resilience plans in the communities [both direct and indirect beneficiaries] (of which 30% are women)	Consultation meeting reports; training session reports and materials; and lists of participants Monitoring and evaluation report	The political and security situation remains stable Government support and communities' commitment; strong involvement and ownership of key actors

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	Number (#) of policies introduced or adjusted to address climate change risks (by sector)			At least 1 policy introduced or adjusted to address climate change risks (by sector) per country	Flood and drought management plans	
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Table 24. Results framework of the project in association with the outcomes and outputs

Outcomes/Outputs	Activities	Key Performance Indicators (KPIs) with Gender disaggregation	Scope of Works	Baseline (2022)	Target Achievements	Means of Verification	Assumptions
Component 1. Improvement of hydrological and meteorological observing system networks							
Outcome 1.1. Strengthened institutional capacity to monitor and detect climate related hazards, thereby contributing to reduce socioeconomic and environmental risks and to protect lives and livelihoods		Percentage (%) of monitoring systems fully equipped and operational Number (#) of operational and maintenance mechanisms in place	Field visits; desk review studies; Analytical work; finding information from existing reports and documents; discussions with relevant agencies and stakeholders	Limited institutional capacity to monitor and detect climate related hazards due to lack of sustainable operation and maintenance mechanism	Available institutional capacity to monitor and detect climate related hazards Sustainable operation and maintenance mechanism in place	Reports of monitoring system in place in the 5 countries Strategic document for sustainability of operation and maintenance	Government support; strong involvement and ownership of key actors
Output 1.1. Hydromet observation network modernized/established	1.1.1 Carry out a detailed analysis of the Hydromet monitoring system (including weather, surface water, groundwater and water quality), and propose possible upgrades of the existing equipment aiming for state-of-the-art data collection e.g. through the use of the Global Hydrometry Support Facility (WMO HydroHub) Innovations Calls. This activity also includes: (a) the develop an inventory of the available station equipment (including transmission techniques) and determination of the complementary equipment to be acquired (by adopting innovative technologies), including specifications and tenders for the five countries of the basin; and (b) carrying out a network optimization study to propose the pilot sites and the priority stations to reinstall, recover and/or acquire (as appropriate) and specify the equipment for each station as well as the list of	Report of the analysis and inventory of the existing stations and related equipment [Yes/No] Number (#) of stations rehabilitated and upgraded Number (#) of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated. Report that documents and provides recommendations related other projects developing different monitoring methods, and	Field visits to the stations; finding information from available reports and documents (e.g. from manufactures/suppliers; other projects); desk review study; meetings and workshops with National Meteorological and Hydrological Services, Ministries, Stakeholders and Developing Partners	No inventory of the existing stations and related equipment Number of stations per country within the Lake Chad Basin: Cameroon - 6 functioning meteorological stations; 408 non-functioning rainfall stations; 30 functioning hydrometric stations CAR - 3 meteorological stations; 0 functioning hydrometric stations Chad - 40 functioning AWS; 15 functioning hydrometric stations Niger - 75 functioning AWS; 10 functioning	Detailed inventory and design of an optimized network 50 stations within the Lake Chad Basin rehabilitated and upgraded or new, of which: Cameroon - 9 stations CAR - 10 stations Chad - 18 stations Niger - 5 stations Nigeria - 8 stations 2 Regional Training on installation and maintenance of the stations, including Training-of-Trainers (at least 25% are women) At least 1 innovative solution in place	Report of the analysis and inventory of the existing stations and related equipment Reports of the Factory Acceptance Test (FAT), Site Acceptance Test (SAT), and Operational Test (OT) of the stations Reports of the Regional Trainings; training materials; and lists of participants Report that documents and provides recommendations related other projects developing	Government support; strong involvement and ownership of key actors Turnover of trained staff is not expected Limited risk of vandalism Procurement/import process going smoothly Station installation proceeding according to plans

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	works and actions to be undertaken. 1.1.2 Rehabilitate and upgrade old stations and install new stations, including training in operation and maintenance of the stations 1.1.3 Document and strengthen collaboration and synergies with other projects developing different monitoring methods for the local conditions (remote sensing, AI, crowdsourcing), in order to develop a catalog of innovative methods and techniques implemented in other countries or in similar conditions that could be applied in the Lake Chad basin and explore their implementation at the regional level	catalog of innovative methods and techniques implemented in other countries or in similar conditions that could be applied in the Lake Chad basin [Yes/No]		hydrometric stations (manual) and 6 automatic stations Nigeria - 8 functioning rainfall stations and 12 AWSs; 12 non-functioning rainfall stations; 103 functioning hydrometric stations, mostly manual No consolidated report with the various innovative methods and techniques for monitoring, nor recommendations for application in the Lake Chad Basin; <u>only traditional approaches in place</u>		different monitoring methods, and catalog of innovative methods and techniques implemented in other countries or in similar conditions that could be applied in the Lake Chad basin	
Output 1.2. Sustainable funding mechanism for Hydromet monitoring identified	1.2.1 Carry out an analysis of the organizational and institutional frameworks of the NMHSs, including the existing legal basis, funding and partnership arrangements, and propose a strategy for sustainable management (operation and maintenance) of monitoring networks 1.2.2 Identify and recommend different financing models of the NMHSs - including involving private sector stakeholders - to build value chains for hydrological and meteorological information	Regional strategy for sustaining O&M of monitoring networks, including financial mechanisms taking into account specificities of individual countries [Yes/No] Number (#) of countries initiating the implementation of the strategy	Desk review study of the existing institutional arrangements and financing mechanisms; finding information from available reports and documents (e.g. from manufactures/suppliers); meetings and workshops with National Meteorological and Hydrological Services, Stakeholders, public and private sector; Analytical work	No mechanism to sustain operation and management of the monitoring networks	Regional strategy for sustaining O&M of monitoring networks, including financial mechanisms taking into account specificities of individual countries, developed 5 countries initiating the implementation of the strategy	Regional strategy for sustaining O&M of monitoring networks, including financial mechanisms taking into account specificities of individual countries Reports of meetings/workshops Progress reports	Government agencies, ministries are committed to actively participate in identifying and establishing funding mechanisms for sustaining the observation networks
Component 2. Strengthening regional hydrometeorological information system (database and data sharing mechanism)							
Outcome 2.1. Enhanced regional cooperation for improved information systems and services with a seamless approach for use in planning and decision-making		Regional hydrometeorological information system (database and data sharing mechanism) fed with data from the 5 countries in	Field visits; desk review studies; acquisition of hardware and software; training sessions and guidance materials	Lake Chad Information System (database and data sharing mechanism) in place; but with limited operation due to lack of	Regional hydrometeorological information system (database and data sharing mechanism) fed with data from the	Progress reports Data-sharing agreements operationalized and institutionalized	Political conditions of the 5 countries and support for the transboundary organization (LCBC)

		[near] real time [Yes/No]		interoperability with national databases or processes for automatic transfer of data from national to regional databases	5 countries in [near] real time		
Output 2.1. A tailored regional interoperable database owned and managed by LCBC and NMHSS	2.1.1 Perform Quality Assessment and Quality Control of historical data of the stations of the project monitoring network in terms of availability, quality, gaps, completeness in both the national and regional databases, transfer/update of any missing data to the regional database from both ground and satellite-based data (at regional level)	Report of the analysis and inventory of the historical data [Yes/No] Regional database fed with data from the 5 countries in [near] real-time [Yes/No] Number (#) of trained staff (of which 30% are women)	Field visits; acquisition of hardware/software; conduct studies and training sessions to perform QA/QC, to install and operate the new systems; development of target guidance materials	Lake Chad Information System (LIS) and associated regional database in place Lack of interoperability with national databases or processes for automatic transfer of data from national to regional databases Outdated databases at country level	Inventory of historical data developed Regional interoperable database operating at regional level with data from the 5 countries being injected in [near] real time Trained all staff operating the regional database and staff at national level responsible for ensuring the transmission and injection of the data into the regional database Gaps (missing data) in the regional database filled in with either ground or satellite-based data	Report of the analysis and inventory of the historical data Bidding documents for the IT infrastructure and tools upgraded Reports of meetings/workshops, trainings, and field visits Progress reports Training and guidance materials	Beneficiaries will implement techniques and tools that are well developed and applied in other regions Active involvement of stakeholders and availability of data/information
	2.1.2 Update/define and institute procedures and routines for data acquisition, quality control, and archiving at the LCBC and in the NMHSS of the five participating countries [taking into account the assessment done under 4.1] (both at regional and national levels)	Number (#) of training and guidance materials Gaps (missing data) in the regional database filled in with either ground or satellite-based data [Yes/No]					
	2.1.3 Upgrade the IT infrastructure (hardware and software, including cloud) to support the operation and transfer of the data from national to regional database (at both regional and national levels)						
	2.1.4 Develop/strengthen a regional database management system according to WMO guidelines to meet the needs of all users, including graphical visualization of main observed variables in real time at the key stations of the network (at regional level)						
Output 2.2. Appropriate data sharing agreements in place and agreed data exchanged using appropriate platforms and standards	2.2.1 Define data exchange mechanisms and procedures; update existing procedures (as required), in relation to new and innovative data and information exchange methods taking into account existing WMO data exchange and metadata registration tools	Number (#) of data sharing agreements operationalized and institutionalized between LCBC and the countries	Desk review study; finding information from available reports and documents; meetings and workshops with National Meteorological	Water Charter ratified by countries Limited data exchanged within the Lake Chad Basin using appropriate	Data sharing agreements operationalized and institutionalized between LCBC and NMHSS in the 5 countries through agreed	Data sharing agreements operationalized and institutionalized between LCBC and the countries Report with the	Government support; strong involvement and ownership of key actors Turnover of trained staff is not expected

	(WIGOS, WIS2.0, WHOS, OSCAR) 2.2.2 Develop/update data sharing protocols according to WMO unified data policy taking into account the relevant agreements developed by LCBC and signed by the 5 countries, including the Water Charter that outlines the responsibilities for operation and maintenance of the regional database management system 2.2.3 Develop an inventory of existing data and metadata publication tools, web services, data formats, data and metadata standards, and vocabularies within LCBC and Member States (to complement ongoing activities in LCBC's projects such as the Knowledge Management Platform from PROLAC project) 2.2.4 Implement free (and open source) data exchange tools and web services supported by WMO and conducting capacity development (to complement ongoing activities in LCBC's projects such as the Knowledge Management Platform from PROLAC project)	Report with the inventory of existing data and metadata publication tools, web services, data formats, data and metadata standards, and vocabularies within LCBC and Member States [Yes/No] Number (#) of free (and open source) data exchange tools and web services implemented Number (#) of trained staff (of which 30% are women)	and Hydrological Services	platforms and standards	data exchange using the platforms and standards established Inventory of existing data and metadata publication tools, web services, data formats, data and metadata standards, and vocabularies within LCBC and Member States Data-exchange tools and web services operating as per standard operating procedures	inventory of existing data and metadata publication tools, web services, data formats, data and metadata standards, and vocabularies within LCBC and Member States Reports of the Operational Test (OT) for the data exchange tools and web services Reports of training sessions and training materials	National policies and monitoring financing models support open data policy
Component 3. Identification and development of hydrometeorological products and services							
Outcome 3.1. Enabling environment created for understanding and addressing the user needs		Environment created to understand and address the user needs [Yes/No]	National and regional consultation meetings	No transboundary EWS in place; some elements of the EWS in place	Environment created to understand and address the user needs through the establishment of national consultation and user-provider workshops	Reports of the national and regional consultation workshops; and reports of the analysis Monitoring and evaluation reports Document describing the transboundary and integrated multi-hazard EWS	The political and security situation remains stable Government support and communities' commitment; strong involvement and ownership of key actors
Output 3.1. A transboundary EWS mechanism designed, based on national needs and transboundary policies, including	3.1.1 Launch regional consultations to gather information and make recommendation on: (a) the effective coordination between national and transboundary policies in the context of flood	Number (#) of regional and national workshops organized (with at least 30% of women)	Regional consultation meetings; design of the EWS	No transboundary EWS in place; some elements of the EWS in place	At least 1 workshop in each country organized to gather information and make recommendations	Reports of the regional consultation workshops; and reports of the analysis	Government support; strong involvement and ownership of key actors

regional guidance and advisories by LCBC	and drought management and climate adaptation; and (b) the information and dissemination modes [regional consultations should be done after the national consultations in 6.1.1]	participants) A transboundary and integrated multi-hazard EWS designed [Yes/No]			on the information and dissemination modes to the populations	Document describing the transboundary and integrated multi-hazard EWS	
	3.1.2. Launch national consultations in the five countries to gather information and make recommendations on the modes of information and dissemination to the populations (taking into account gender distinctions and their different social roles), including the most vulnerable				At least 1 regional workshop organized to gather information and make recommendation on effective coordination mechanisms (national and transboundary) and on the information and dissemination modes		
	3.1.3. Collect feedback and make recommendations on the needs for interconnection with transboundary policies and present recommendations to policy makers in the five participating countries [in articulation with 6.1]				Report with the collected feedback and with recommendations on needs for interconnection with transboundary policies and dissemination of information		
	3.1.4. Revise, update, develop and document process and protocols to monitor flood and drought in local pilot areas, at national and regional scale, as well as to act and make coordinated decisions on the development of alerts, dissemination, and responses				At least 1 regional workshop to present and validate recommendations		
	3.1.5. Design a transboundary EWS mechanism, including regional guidance and advisories by LCBC, taking into account a community-based approach, as well as the national needs and transboundary policies gathered under Activities 3.2.1 to 3.2.2 [implementation is under Component 5]				Transboundary and integrated multi-hazard EWS designed		
Output 3.2. User needs and requirements understood by NMHSs, public and private sectors	3.2.1 Organize WMO HydroHub User-provider Workshops (involving NMHSs, public and private sectors) at regional level and make detailed analysis of the diverse user groups and associated needs	Number (#) of WMO Regional HydroHub User-provider Workshops Report with the compilation of the information and recommendations [Yes/No]	Regional consultation meetings; analytical work; discussions with relevant agencies and stakeholders	Limited understanding of the knowledge and infrastructure and services needs on the basin	At least 1 WMO Regional HydroHub User-provider Workshop (involving NMHSs, public and private sectors) to make detailed analysis of the diverse user groups and associated needs; and validate the	Reports of the regional consultation meetings and webinars; and report of the analysis	Government support; strong involvement and ownership of key actors
	3.2.2 Produce a compilation of the respective needs and requirements from the exchanges to improve the performance of NMHSs and						

	<p>explore new markets for NMHSs' services</p> <p>3.2.3 Evaluate entry points for participation of different user groups as identified from their capacities, responsibilities, habits for example through partnerships for data collection and sharing, updating or setting up of monitoring networks and user feedback on monitoring and EWS services in terms of quality and usefulness</p> <p>3.2.4 Collectively (providers and users) define recommendations for cooperation and active communication to ensure that services are continuously tailored and improved</p>				<p>results</p> <p>Report with the compilation of the information and recommendations</p> <p>At least 2 User-Provider webinars</p>		
Outcome 3.2. Development of products and services for climate-adaptative and responsive planning and development		Number (#) products and services for climate-adaptative and responsive planning and development	Field visits; national and regional consultation meetings; product development; training sessions	Insufficient and inadequate products and services for climate-adaptative and responsive planning and development	<p>At least 6 new products and services developed</p> <p>A Web Portal for product dissemination and feedback</p>	<p>Reports of the national consultation workshops; and reports of the analysis</p> <p>Documents describing the new products and verification results of their application to the Lake Chad Basin</p> <p>Reports of training events; training materials; and lists of participants</p> <p>Monitoring and evaluation reports</p>	<p>Government support; strong involvement and ownership of key actors</p> <p>Turnover of trained staff is not expected</p>
Output 3.3. Climate risk assessed and services/products developed for the basin, including for food security and environmental services	<p>3.3.1 Conduct a detailed Climate Risk Assessment of the Lake Chad Basin, including field studies, to identify vulnerability and exposure to risk factors; and create climate risk registers and catalogs disaggregating data by gender and age categories</p> <p>3.3.2 Training on the use and assessment of global and regional numerical weather prediction model outputs (such as quantitative precipitation forecasts), as well as sub-seasonal to seasonal</p>	<p>Number (#) of national consultation meetings</p> <p>Number (#) of staff trained (of which 50% are women)</p> <p>Number (#) of new products developed based on global and regional NWP</p>	Field visits; national and regional consultation meetings; product development; training sessions	No Climate Risk Assessment of the Lake Chad Basin	<p>At least 5 national consultation meetings (1 per country) to gather information</p> <p>Relevant staff trained (of which 30% are women)</p> <p>At least 3 new products developed based on global and regional NWP</p>	<p>Reports of the national consultation workshops; and reports of the analysis</p> <p>Documents describing the new products and verification results of their application to the Lake Chad Basin</p> <p>Reports of training events; training</p>	<p>Government support; strong involvement and ownership of key actors</p> <p>Turnover of trained staff is not expected</p>

	<p>meteorological forecasts, for the Lake Chad basin to help in estimating runoff/ streamflow in S2S scale (feeding into HydroSOS products), and also forecast floods and droughts in the Lake Chad basin in order to improve the LCBC planning</p> <p>3.3.3 Disseminate information among stakeholders and assess the impacts of climate change and future risks in different sectors (including for food security and environmental services) and to gather feedback for improving products and services</p> <p>3.3.4 Conduct a willingness-to-pay (WTP) survey among stakeholders to gather feedback on most preferred climate-related products and services which could be paid for by policy makers and community dwellers as part of sustainability considerations for DRR and food security [associated with 3.3.3, 5.2.1, 5.2.2, 6.1.2, 6.2.2]</p>	<p>A willing-to-pay survey developed and conducted [Yes/No]</p>			<p>At least 5 national consultation meetings (1 per country) to disseminate the new products and assess the impacts, and gather feedback on their usefulness and accuracy</p> <p>A willingness-to-pay survey developed and conducted</p>	<p>materials; and lists of participants</p> <p>Monitoring and evaluation reports</p>	
<p>Output 3.4. Flood and drought forecasting tools and EWS within the riparian countries in place and coordination at regional level improved</p>	<p>3.4.1 Carry out a detailed analysis of hydrological forecasting tools and EWS (related to floods and droughts) within the participating countries and at the regional level, with a view of determining possible upgrades of the existing systems and mechanisms for a state-of-the-art (impact-based) EWS</p> <p>3.4.2 Structure the processes to scale up the use of meteorological and hydrological observation and monitoring methods based on remote sensors (e.g. satellite altimetry, Raincell) applied in Chad, and analyze the feasibility of such methods in pilot areas of Lake Chad [in articulation with 1.1.3]</p> <p>3.4.3 Undertake extreme value analysis for the determination of flood and drought risk thresholds for the various hazard-prone areas of the Lake Chad basin, as well as thresholds based on</p>	<p>Number (#) of national consultation meetings</p> <p>Number (#) of staff trained (of which 30% are women)</p> <p>Flood and drought thresholds determined [Yes/No]</p> <p>New meteorological and hydrological observation and monitoring methods based on remote sensors applied to the Lake Chad region [Yes/No]</p> <p>A flow forecasting information system implemented for</p>	<p>Field visits; national and regional consultation meetings; product development; training sessions</p>	<p>Insufficient and inadequate hydrological forecasting tools and systems</p>	<p>At least 5 national consultation meetings (1 per country)</p> <p>Relevant staff trained (of which 30% are women)</p> <p>Flood and drought thresholds determined</p> <p>New meteorological and hydrological observation and monitoring methods based on remote sensors applied to the Lake Chad Basin</p> <p>A flow forecasting information system implemented for the Lake Chad Basin</p>	<p>Reports of the national consultation workshops; and reports of the analysis</p> <p>Documents describing the methods and results of the studies to determine flood and drought thresholds</p> <p>Reports of the feasibility studies and results of the application of new meteorological and hydrological observation and monitoring methods based on remote sensors</p> <p>Documents describing the flow forecasting</p>	<p>Government support; strong involvement and ownership of key actors</p> <p>Turnover of trained staff is not expected</p>

	<p>historical events in consultation with technical services and local representatives</p> <p>3.4.4 Develop a flow forecasting information system for the Lake Chad basin taking into account various available and existing models, and establish a framework for comparison and analysis of information adapted to forecasters and operators</p>	the Lake Chad Basin [Yes/No]			A framework for comparison and analysis of information adapted to forecasters and operators established	<p>information system for the Lake Chad; and the established framework for comparison and analysis of information</p> <p>Reports of training events; training materials; and lists of participants</p> <p>Monitoring and evaluation reports</p>	
Output 3.5. A framework for the production and sharing of hydrological status assessments and outlook products in place to inform water resource management	<p>3.5.1 Apply the Global Hydrological Status and Outlook System (HydroSOS) concept, standards and tools, explore the improvement and the development of products based on available Hydromet information (in situ and remotely sensing data), if available local models and downscaling of global models to provide a comprehensive overview of the state of the basin's water resources as well as the hydrological outlook for the coming weeks and months (seasonal to sub-seasonal time scales)</p> <p>3.5.2 Update/set up a web portal to disseminate the Lake Chad basin related HydroSOS products (at country and regional level and to the HydroSOS global portal) [linked with the Lake Chad Information System (LIS)]</p> <p>3.5.3 Sensitize and train NMHSs, national and regional institutions and research centers on the different uses of Lake Chad Basin water resources information. Produce easy-to-digest (or understandable) bulletins (as outputs of HydroSOS portals) for hydrological status and outlooks based on the user requirements, to assist users and policy makers in decision making</p>	<p>Number (#) of Regional Hydrological Outlook Forum or similar HydroSOS event (in which 30% of the participants are women)</p> <p>Number (#) of trained staff (of which 30% are women)</p> <p>Web Portal set up/updated [Yes/No]</p> <p>Number (#) of HydroSOS related products</p>	Regional national consultations; product development; set up web portals (regional and national levels); and training sessions	<p>No use of the HydroSOS concept, standards and tools; only Nigeria initiated consultations</p> <p>No basin-wide hydrological status nor available sub-seasonal to seasonal hydrological predictions. But Niger and Nigeria NMHS with some capacity to produce HydroSOS related products. Very limited limited capacity in Camerron, CAR and Chad NMHSs.</p>	<p>At least 1 regional and 5 national stakeholders consultation workshops (1 per country) to conduct a comprehensive diagnostic of the hydromet capacities at regional and national levels</p> <p>At least 1 or 2 HydroSOS-based products (according to the capacity of the countries at the baseline; 1 for very low capacity and 2 for those with some capacity) developed and disseminated</p> <p>A Web Portal set up/updated</p> <p>At least 2 Regional Hydrological Outlook Forums or similar HydroSOS events conducted</p> <p>At least 2 regional trainings conducted</p>	<p>Reports of the regional and national consultation workshops; and reports of the comprehensive diagnostics</p> <p>Documents describing the HydroSOS-based products' development and application/use</p> <p>Web Portal</p> <p>Reports of the capacity of the Regional Hydrological Outlook Forums or similar event; and lists of participants</p> <p>Reports of the regional trainings; training materials; and lists of participants</p>	<p>Government support; strong involvement and ownership of key actors</p> <p>Turnover of trained staff is not expected</p>
Component 4. Training of project stakeholders and knowledge development							

	<p>Outcome 4.1. Strengthened institutional and human capacities at regional and national levels to operate and maintain the infrastructure and tools made available through the project</p>	<p>Human capacity developed [Yes/No]</p> <p>Organizational reform strategy prepared [Yes/No]</p> <p>Number (#) of trainings delivered</p>	<p>Regional and national workshops; training sessions and materials</p>	<p>Limited institutional and human capacities at regional and national levels to operate and maintain the infrastructure and tools made available through the project</p>	<p>Human capacity developed</p> <p>Relevant NMHSs and LCBC staff trained in the installation, maintenance and management of monitoring stations; and in data management and information systems</p> <p>Recommendations and a proposal for institutional reform with an action plan</p> <p>At least 2 regional (including training-of-trainers) and 15 national trainings organized and delivered</p>	<p>Reports of regional and national workshops</p> <p>Reports of trainings, list of participants</p> <p>Surveys before and after training</p> <p>Organizational reform strategy</p>	<p>Government support; strong involvement and ownership of key actors</p> <p>Turnover of trained staff is not expected</p>
<p>Output 4.1. Organizational arrangements at a national and regional levels and development plans prepared and implemented</p>	<p>4.1.1 Undertake an assessment of existing operating procedures and human resources capacities for Hydromet monitoring and data management making use of the WMO HydroHub Capacity and Needs Assessment; and in collaboration with all relevant stakeholders, develop recommendations and a proposal for an organizational reform strategy with an action plan to enhance institutional arrangements in the five countries of the Lake Chad basin</p> <p>4.1.2 Develop a needs-based training programme and action plan for staff from national and regional institutions and deliver tailored training for the development of project activities</p>	<p>Reports of the assessment of the existing operational procedures and human resources capacities at LCBC and in the 5 countries [Yes/No]</p> <p>Number (#) of training programs and action plans prepared</p> <p>Organizational reform strategy with an action plan to enhance institutional arrangements in the five countries of the Lake Chad basin developed [Yes/No]</p>	<p>Field visits; desk review studies; finding information from existing reports and documents; discussions with relevant agencies; regional and national workshops</p>	<p>No assessment of the human resources capacities in the 5 countries and at LCBC</p> <p>No capacity development strategy in the 5 countries and at LCBC</p>	<p>6 assessments of the existing operational procedures and human resources capacities</p> <p>6 training programs and action plans for the next four years (one per each country and one for LCBC)</p> <p>Organizational reform strategy with an action plan to enhance institutional arrangements in the five countries of the Lake Chad basin</p>	<p>Reports of the assessment of the existing operational procedures and human resources capacities at LCBC and in the 5 countries</p> <p>Training programs and action plans</p> <p>Organizational reform strategy with an action plan to enhance institutional arrangements in the five countries of the Lake Chad basin</p>	<p>Government support; strong involvement and ownership of key actors</p> <p>Turnover of trained staff is not expected</p>
<p>Output 4.2. Hydromet staff is trained in monitoring, information systems and</p>	<p>4.2.1 Train/reskill relevant NMHSs and LCBC staff in installation, maintenance and management of monitoring stations, including quality assurance, quality control</p>	<p>Number (#) of trained staff (of which 30% are women) that are proficient with installation,</p>	<p>Training sessions and materials</p>	<p>Limited capacity to operate and maintain monitoring and information systems</p>	<p>Relevant NMHSs and LCBC staff trained in the installation, maintenance and management of</p>	<p>Training session reports, list of participants and training materials</p> <p>Surveys/tests at</p>	<p>Government support; strong involvement and ownership of key actors</p>

service delivery (with gender disaggregation)	aspects, data transmission and maintenance of equipment according to WMO standards and safety	maintenance and management of monitoring stations			monitoring stations; and in data management and information systems	the beginning and at the end of the training sessions	Turnover of trained staff is not expected
	4.2.2 Train/reskill LCBC and NHMSs' staff in data management and information systems made available, including strengthening/development of hydrological information products and mechanisms for data and metadata interoperability in LCBC and NMHSs				At least 1 regional (including training-of-trainers) and 5 national trainings in the installation, maintenance and management of monitoring stations organized and delivered		
	4.2.3 Reskill monitoring station observers and train them in the operation and maintenance of new generation hydrometeorological equipment, prevention of vandalism and in the importance of sustaining observations	Number (#) of trained staff (of which 30% are women) that are proficient with data management and information systems			At least 1 regional (including training-of-trainers) and 5 national trainings in data management and information systems organized and delivered		
					At least 5 national trainings to reskill monitoring station observers organized and delivered		
					Relevant staff trained (of which 30% are women)		
Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services (Communication and timely diffusion of appropriate product and services to end users)							
Outcome 5.1. Enhanced communication and awareness programmes on Hydromet and early warning systems	Stakeholder engagement in Hydromet and EWS, and of user feedback mechanisms in place [Yes/No]	Consultative meetings with relevant stakeholders and Ministerial Roundtables; call interviews; website	Limited stakeholder engagement in Hydromet and EWS	Stakeholder engagement in Hydromet and EWS and user feedback mechanisms in place	Consultation meeting reports; and lists of participants	The political and security situation remains stable	Government support and communities' commitment; strong involvement and ownership of key actors
			No user feedback mechanisms in place		Reports of the WMO Hydromet Ministerial Roundtables; and lists of participants		
					User feedback survey for call interviews		

						Web-based user feedback survey					
Output 5.1. Awareness raised for decision makers, lawmakers and water users and strategy for stakeholders' engagement developed (with gender disaggregation)	5.1.1 Organize awareness-raising activities for decision-makers, legislators and water users, including through the WMO HydroHub Ministerial Roundtables. Dialogues organized in the last year of the project's development should, as far as possible, use the benefits of the project's activities as an illustration (showcase cost-benefits and added value of Hydromet services)	Number (#) of Cost-Benefit Analysis (CBA) of the project and added value of hydromet services (1 regional and 5 national)	Participative consultation meetings with relevant stakeholders and organizations at regional and national levels; at least 2 WMO HydroHub Ministerial Roundtables; at least 2 stakeholders' consultations per country for the implementation of the strategy	No detailed CBA developed; preliminary studies done for Chad, Niger, Nigeria and region	5 National CBAs and 1 regional CBA	At least 1 WMO Hydromet Ministerial Roundtable for awareness raising	Consultation meeting reports; and lists of participants	Government support and communities' commitment; strong involvement and ownership of key actors			
	5.1.2 Develop a gender-responsive stakeholder engagement strategy and action plan for continuous engagements with key stakeholders, including Civil Society Organizations (CSOs), private sector, government departments and local community representatives	Number (#) of WMO HydroHub Ministerial Roundtables [or LCBC Heads of Summit or other high-level event] for awareness raising (with 50% of women participation)							No gender-responsive stakeholder engagement strategy	Gender-responsive stakeholder engagement strategy developed	Reports of the WMO HydroHub Ministerial Roundtables; and lists of participants
	5.1.3 Implement the stakeholder engagement strategy and action plan (developed under Activity 5.1.2) and support institutionalization of the process to ensure continued engagement beyond project implementation	Gender-responsive stakeholders engagement strategy and action plan at regional and national levels [Yes/No]									
Output 5.2. User feedback mechanism institutionalized through a collaborative framework for continuous dialogue and understanding evolving needs and feedback mechanisms across the value cycle for improvement of hydrological products and services	5.2.1 In close co-operation with users, develop appropriate user feedback mechanisms and identify novel and user-friendly channels that allow continuous feedback and engagement from all users of hydrometeorological services	User feedback survey	Consultative meetings with relevant stakeholders; call interviews; website	No feedback mechanism in place	User feedback survey for call interviews	User feedback survey for call interviews	Government support and communities' commitment; strong involvement and ownership of key actors				
	5.2.2 Implement and support the institutionalization of the user feedback mechanisms to ensure continued improvement of hydrometeorological products and services	Number (#) of channels for gathering user feedback and engagement						Web-based user feedback survey	Analysis of the results of the feedback provided by users	Web-based user feedback survey	Reports of the analysis of the results of the feedback provided by users
Outcome 5.2. Enhanced preparedness and response capability to act upon warning and risk information to		Number (#) of men, women,	Local workshops; training sessions	Limited preparedness and	At least 500 community	Consultation meeting reports;	The political and security situation				

<p>minimize impact of hydromet disasters on lives, livelihoods and socio-economic systems</p>	<p>elderly, youths, and disabled people trained and capable to (of which 30% are women) to act upon warning and risk information</p> <p><u>Number (#) of early warning systems (by scale) and number (#) of beneficiaries covered</u></p> <p>Transboundary and integrated multi-hazard EWS [Yes/No]</p>	<p>and materials; engagement of NGO working at local level</p>	<p>response capability to act upon warning and risk information</p> <p>No transboundary and integrated multi-hazard EWS in place; some elements of EWS target to specific sectors are in place</p>	<p>individuals (of which at least 30% are women) are trained and capable to respond and act upon warning and risk information</p> <p><u>At least 1 transboundary and integrated multi-hazard EWS in place, and at least 22.5 million beneficiaries covered [both direct and indirect beneficiaries] (of which at least 30% are women)</u></p> <p>Transboundary and integrated multi-hazard EWS in place</p>	<p>training session reports and materials; and lists of participants</p> <p>Monitoring and evaluation report</p> <p>Quarterly reports of the NGOs that support the implementation of the plans</p>	<p>remains stable</p> <p>Government support and communities' commitment; strong involvement and ownership of key actors</p>	
<p>Output 5.3. A communication and warning dissemination system set up, operational and accessible to a wide audience, including vulnerable people (taking into account needs of marginalized groups; Gender disaggregated)</p>	<p>5.3.1 Following the design prepared under Component 3, implement at LCBC a hydro-meteorological information system that would provide regional guidance and advisories based on data regularly received at regional level from the stations to <u>updating the regional database</u></p> <p>5.3.2 Develop learning and communication materials (including in local languages) for practitioners, policy makers, parliamentarians, women and youth, including videos, websites, brochures, radio announcements etc., in collaboration with national agencies.</p> <p>5.3.3 Organize upscaling of contingency planning at community level, building on the experience in the pilot communities [in articulation with 6.1]</p>	<p>LCBC regional guidance and advisories issued regularly and disseminated on a dedicated web-based system [Yes/No]</p> <p>Learning and communication materials developed [Yes / No]</p> <p>Methodological guidance developed for upscaling of community contingency planning in the countries [Yes / No]</p> <p>Number of institutions strengthened on community contingency plans</p>	<p>Studies; discussions with relevant agencies; regional and national workshops; development of communication material; training sessions and materials</p>	<p>No LCBC regional guidance and advisories</p> <p>No communication materials</p> <p>Limited capacity on development of community contingency plans in the countries</p>	<p>LCBC regional guidance and advisories issued regularly and disseminated on a dedicated web-based system</p> <p>National institutions are aware and trained on the development of community contingency planning</p> <p>Learning and communication materials developed</p> <p>Methodological guidance developed for upscaling of community contingency planning in the countries</p>	<p>Monitoring and evaluation report</p> <p>Learning and communication materials</p> <p>Reports of awareness raising and training events</p>	<p>Government support and communities' commitment; strong involvement and ownership of key actors</p>
<p>Output 5.4. Inclusive warning messages</p>	<p>5.4.1 Engage communities to develop, test and evaluate last-mile arrangements to</p>	<p>Number (#) of local workshops organized with</p>	<p>Engagement of NGOs to work with the pilot</p>	<p>Lack of tailored warning messages that are accessed,</p>	<p>At least 2 local workshop per pilot community</p>	<p>Consultation meeting reports; and lists of</p>	<p>Government support and communities'</p>

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accessed, received, understood and trusted by user communities in the Lake Chad basin (taking into account the needs of marginalized groups; Gender disaggregated)	ensure that warnings and advisories are understandable and actionable for the most vulnerable populations (including women, children and the elderly) 5.4.2 Organize the development of community contingency plans that are inclusive and gender responsive in pilot communities and support to bring them into service 5.4.3 Organize meetings and training sessions for the population in the pilot sites in the five countries on the interpretation of information disseminated through official channels that are part of the inclusive early warning system (designed under Component 3), ensuring equal participation of men and women, and share lesson learned.	pilot communities and relevant stakeholders and organizations to tailor warning messages and ensure community engagements Development of contingency plans in the pilot communities [Yes / No] Number (#) of trainings per pilot communities	communities; Participative consultation meetings with pilot communities and relevant stakeholders and organizations; Development of community contingency plans	received, understood and trusted by user communities	1 community contingency plan in each pilot community At least 3 training sessions per pilot community	participants Reports of the training sessions and training materials; lists of participants Monitoring and evaluation report Quarterly reports of the NGOs that support the local activities	commitment; strong involvement and ownership of key actors
Component 6. Plans and communities' response capacity							
Outcome 6.1. Enhanced governance mechanisms at the basin level and increased adaptive capacity within the agricultural and natural resource sectors as well as disaster risk management		<u>Number (#) of policies introduced or adjusted to address climate change risks (by sector)</u> Community-led and gender-responsive risk mitigation and climate resilience plans [Yes/No]	National and local workshops and consultations; analysis; training sessions and materials; engagement of NGO working at local level	Insufficient integration of flood and drought management and climate resilience in policies, plans, strategies and laws Lack of community-led and gender-responsive risk mitigation and climate resilience plans	<u>At least 1 policy introduced or adjusted to address climate change risks (by sector) per country</u> At least 5 community-led and gender-responsive strategies and plans for risk mitigation and climate resilience developed and implemented	Consultation meeting reports; training session reports and materials; and lists of participants Monitoring and evaluation report	The political and security situation remains stable Government support and communities' commitment; strong involvement and ownership of key actors
Output 6.1. Plans, policies, strategies for integrated flood and drought management, risk mitigation and climate resilience at regional, basin and national levels supported	6.1.1 Organize and conduct national workshops to identify gaps and needs in policies and plans, and to highlight and make recommendations for key long-term strategies for integrated flood and drought management 6.1.2 Based on the detailed Climate Risk Assessment developed in 3.1.1, and in conjunction with the relevant stakeholders, develop a gender-responsive basin-level	Number (#) of national workshops related to policies and plans Number (#) of training sessions on Gender Mainstreaming Draft flood and drought management	National workshops; consultations; analyses; awareness raising and training sessions	Limited integration of flood and drought management and climate resilience in policies, plans, strategies and laws	At least 2 national workshops per country At least 1 training session on Gender Mainstreaming per country (with at least 50% women) Gender responsive basin level flood and drought	Consultation meeting reports; and lists of participants Training reports and materials; and lists of participants Flood and drought management plans	Governments support and commitment; strong involvement and ownership of key actors

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	<p>drought management plan and flood management plan</p> <p>6.1.3 Support the institutionalization of the flood and drought management plans in major institutions in the Lake Chad Basin</p> <p>6.1.4 Organize and conduct workshops (at least one per country) on the Training Manual for Gender Mainstreaming in Flood and Drought Risk Forecasting and Management with participants from NMHSs, local decision makers, civil authorities, women and community organizations, etc.</p> <p>6.1.5 Develop policy briefs and support integration of flood and drought management and climate resilience in policies, plans, strategies, and laws</p>	<p>plans prepared at basin level [Yes/No]</p> <p>Number (#) of regional and national institutions supported for integration of flood and drought management and climate resilience in policies, plans, strategies and laws</p> <p>Report with recommendations to integrate flood and drought management and climate resilience in policies, plans, strategies and laws developed [Yes/No]</p>			<p>management plans developed</p> <p>At least 5 institutions supported for their institutionalization</p> <p>At least 5 national institutions supported to integrate flood and drought management and climate resilience</p> <p>Report with recommendations to integrate flood and drought management and climate resilience</p>	<p>Monitoring and evaluation report</p> <p>Report with recommendations to integrate flood and drought management and climate resilience in policies, plans, strategies and laws</p>	
<p>Output 6.2. Medium and long-term adaptation and mitigation measures recommended in the pilot vulnerable areas (taking into account Gender, youth and disabled people needs)</p>	<p>6.2.1 Develop a national roadmap or action plan for the establishment of community-led risk mitigation and climate resilience plans, including the selection of priority catchments/communities including gender, youth and other social criteria as critical to determine vulnerability for pilot implementation under this proposed project</p> <p>6.2.2 Cost potential community level risk mitigation and climate resilience measures in the Lake Chad Basin and identify potential sustainable financing strategies</p> <p>6.2.3 In priority selected catchments, develop and implement community-led and gender responsive risk mitigation and climate resilience plans</p>	<p>Roadmap / action plan for the establishment of community-led risk mitigation and climate resilience plans [Yes/No]</p> <p>Report on cost of community level risk mitigation and climate resilience measures and financing strategies [Yes/No]</p> <p>Number (#) of meetings organized with pilot communities and relevant stakeholders and organizations</p> <p>Community-led and gender responsive risk mitigation and climate resilience plans developed for the pilot</p>	<p>Analyses; Participative consultation meetings with pilot communities and relevant stakeholders and organizations; at least 1 pilot community per country; engagement of NGOs working at the pilot communities to implement the plans</p>	<p>Limited community-led and gender responsive risk mitigation and climate resilience plans</p>	<p>Roadmap / action plan for the establishment of community-led risk mitigation and climate resilience plans developed</p> <p>Report on cost of community level risk mitigation and climate resilience measures and financing strategies developed</p> <p>At least 2 meetings in each pilot community (one per country)</p> <p>Community-led and gender responsive risk mitigation and climate resilience plans in the pilot communities developed</p>	<p>Roadmap / action plan for the establishment of community-led risk mitigation and climate resilience plans</p> <p>Consultation meeting reports; and lists of participants</p> <p>Monitoring and evaluation report</p> <p>Quarterly reports of the NGOs that support the development and implementation of the plans</p>	<p>Government support and communities' commitment; strong involvement and ownership of key actors</p>

		communities [Yes/No]				
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F. Demonstrate how the project/programme aligns with the Results Framework of the Adaptation Fund

The main goal of the proposed project is to increase resilience of the population living in the Lake Chad basin by enhancing the countries capability to manage and adapt to climate-related risks through improvement of hydrometeorological monitoring, data systems and service delivery and awareness on climate-related hazards. The Adaptation Fund Results Framework Outcomes 1, 2, 3, 4, 7 and 8 are covered by the project. **Table 25** provides the links between each component, outcome and output with the Results Framework of the Adaptation Fund.

Table 25. Alignment of the project components, outcomes and outputs with the Results Framework of the Adaptation Fund.

Project Objective(s)	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Component 1. Improvement of hydrological and meteorological observing systems networks	Percentage (%) of the hydrometeorological events detected and monitored	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	1 812 500
		Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets	4.1. Responsiveness of development sector services to evolving needs from changing and variable climate 4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	
		Outcome 8: Support the development and diffusion of innovative adaptation practices, tools and technologies	8. Innovative adaptation practices are rolled out, scaled up, encouraged and/or accelerated at regional, national and/or subnational level	
Component 2. Strengthening regional hydrometeorological information systems	Regional hydrometeorological information system (database and data sharing mechanism) fed with data from the 5 countries in [near] real time [Yes/No]	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	822 500
		Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets	4.1. Responsiveness of development sector services to evolving needs from changing and variable climate 4.2. Physical infrastructure improved to withstand climate change and variability-induced stress	
		Outcome 1: Reduced exposure to climate-related hazards and threats	1. Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	
Component 3. Identification of user needs and development of hydrometeorological products and services	Percentage (%) of improvement in populations' resilience to floods and drought events forecasted with sufficient leadtime to allow that preparedness measures are taken by the communities	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	2 542 500

		Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	
		Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets	4.1. Responsiveness of development sector services to evolving needs from changing and variable climate	
		Outcome 8: Support the development and diffusion of innovative adaptation practices, tools and technologies	8. Innovative adaptation practices are rolled out, scaled up, encouraged and/or accelerated at regional, national and/or subnational level	
Component 4. Training of project stakeholders and knowledge development	Number (#) of regional and national trainings Organizational reform strategy prepared [Yes/No]	Outcome 2: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	805 000
Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services, and communication and timely diffusion of appropriate product and services to end users	Number (#) of communication and awareness campaigns	Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	1 526 500
	Number (#) of people benefit from warning and risk information [both direct and indirect beneficiaries] (of which 30% are women)	Outcome 4: Increased adaptive capacity within relevant development sector services and infrastructure assets	4.1. Responsiveness of development sector services to evolving needs from changing and variable climate	
	Transboundary and integrated multi-hazard EWS [Yes/No]	Outcome 7: Improved policies and regulations that promote and enforce resilience measures	7. Climate change priorities are integrated into national development strategy	
Component 6. Plans and communities' response capacity	Number (#) of people benefiting from the risk mitigation and climate resilience plans in the communities [both direct and indirect beneficiaries] (of which 30% are women)	Outcome 1: Reduced exposure to climate-related hazards and threats	1. Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	1 485 000
		Outcome 3: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	
		Outcome 7: Improved policies and regulations that promote and enforce resilience measures	7. Climate change priorities are integrated into national development strategy	
Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator	Grant Amount (USD)

Outcome 1.1. Strengthened institutional capacity to monitor and detect climate related hazards, thereby contributing to reduce socioeconomic and environmental risks and to protect lives and livelihoods	Percentage (%) of monitoring systems fully equipped and operational	Output 2.1: Strengthened capacity of national and sub-national centres and networks to respond rapidly to extreme weather events	2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	1 812 500
	<u>Number (#) of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated</u>	Output 4: Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by sector and scale)	
		Output 8: Viable innovations are rolled out, scaled up, encouraged and/or accelerated	8.1. No. of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated	
	Number (#) of operational and maintenance mechanisms in place	Output 2.1: Strengthened capacity of national and sub-national centres and networks to respond rapidly to extreme weather events	2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	
Outcome 2.1. Enhanced regional cooperation for improved information systems and services with a seamless approach for use in planning and decision-making	Regional hydrometeorological information system (database and data sharing mechanism) fed with data from the 5 countries in [near] real time [Yes/No]	Output 2.1: Strengthened capacity of national and sub-national centres and networks to respond rapidly to extreme weather events	2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	822 500
		Output 4: Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by sector and scale)	
Outcome 3.1. Enabling environment created for understanding and addressing the user needs	Environment created to understand and address the user needs [Yes/No]	Output 4: Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability	4.1.1. No. and type of development sector services modified to respond to new conditions resulting from climate variability and change (by sector and scale)	680 000
Outcome 3.2. Development of products and services for climate-adaptative and responsive planning and development	Number (#) products and services for climate-adaptative and responsive planning and development	Output 1.1: Risk and vulnerability assessments conducted and updated	1.1.2. No. of early warning systems (by scale) and no. of beneficiaries covered	1 862 500
		Output 2.1: Strengthened capacity of national and sub-national centres and networks to respond rapidly to extreme weather events	2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	
		Output 3.2: Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	3.2.2 No. of tools and guidelines developed (thematic, sectoral, institutional) and shared with relevant stakeholders	
		Output 8: Viable innovations are rolled out, scaled up, encouraged and/or accelerated	8.1. No. of innovative adaptation practices, tools and technologies accelerated, scaled-up and/or replicated	

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Outcome 4.1. Strengthened institutional and human capacities at regional and national levels to operate and maintain the infrastructure and tools made available through the project	Human capacity developed [Yes/No]	Output 2.1: Strengthened capacity of national and sub-national centres and networks to respond rapidly to extreme weather events	2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events (by gender)	805 000
	Organizational reform strategy prepared [Yes/No]		2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	
	Number (#) of trainings delivered		2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events (by gender)	
Outcome 5.1. Enhanced communication and awareness programmes on Hydromet and early warning systems	Stakeholder engagement in Hydromet and EWS, and of user feedback mechanisms in place [Yes/No]	Output 4: Vulnerable development sector services and infrastructure assets strengthened in response to climate change impacts, including variability	4.1.1. No. and type of development sector services modified to respond to new conditions resulting from climate variability and change (by sector and scale)	755 000
			Output 2.2: Increased readiness and capacity of national and sub-national entities to directly access and program adaptation finance	
Outcome 5.2. Enhanced preparedness and response capability to act upon warning and risk information to minimize impact of hydromet disasters on lives, livelihoods and socio-economic systems	Number (#) of men, women, elderly, youths, and disabled people trained and capable to (of which 30% are women) to act upon warning and risk information	Output 3.2: Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	3.2.1 No. of technical committees/associations formed to ensure transfer of knowledge	771 500
	Transboundary and integrated multi-hazard EWS [Yes/No]	Output 7: Improved integration of climate-resilience strategies into country development plans	7.1. No. of policies introduced or adjusted to address climate change risks (by sector)	
	<u>Number (#) of early warning systems (by scale) and number (#) of beneficiaries covered</u>	Output 1.1: Risk and vulnerability assessments conducted and updated	1.1.2. No. of early warning systems (by scale) and no. of beneficiaries covered	
Outcome 6.1. Enhanced governance mechanisms at the basin level and increased adaptive capacity within the agricultural and natural resource sectors as well as disaster risk management	<u>Number (#) of policies introduced or adjusted to address climate change risks (by sector)</u>	Output 7: Improved integration of climate-resilience strategies into country development plans	7.1. No. of policies introduced or adjusted to address climate change risks (by sector)	1 485 000
	Community-led and gender-responsive risk mitigation and climate resilience plans [Yes/No]	Output 1.2: Targeted population groups covered by adequate risk reduction systems	7.2. No. of targeted development strategies with incorporated climate change priorities enforced	
			1.2.1. Percentage of target population covered by adequate risk-reduction systems	
			Output 3.2: Strengthened capacity of national and subnational stakeholders and entities to capture and disseminate knowledge and learning	

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G. Include a detailed budget with budget notes, broken down by country as applicable, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

The total budget of the Lake Chad project is estimated at USD 10,755, Million for the development of activities in the five participating countries, including an amount of USD 855,000 for project management and an amount of USD 900,000 to cover the expenses of the implementing entity. The detailed budget for the activities is provided in **Table 26a** (with the budget notes described in **Table 26b**), the breakdown of the project cycle management fees charged by the Implementing Entity is provided in **Table 27**, and the breakdown of the project Execution costs is provided in **Table 28**.

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Table 26a. Detailed budget for the activities.

Outcome/Output	Activities	Budget Type	Budget Notes	Number of Units	Cost per Unit (USD)	Total Cost for the Activity (USD)	Total Cost for the Output (USD)	Total Cost for the Outcome (USD)	Budget Year 1 (USD)	Budget Year 2 (USD)	Budget Year 3 (USD)	Budget Year 4 (USD)	Budget Year 5 (USD)
Component 1. Improvement of hydrological and meteorological observing systems networks													
Outcome 1.1. Strengthened institutional capacity to monitor and detect climate related hazards, thereby contributing to reduce socioeconomic and environmental risks and to protect lives and livelihoods													
Output 1.1. Hydromet observation network modernized/established	1.1.1 Carry out a detailed analysis of the Hydromet monitoring system (including weather, surface water, groundwater and water quality), and propose possible upgrades of the existing equipment aiming for state-of-the-art data collection e.g. through the use of the Global Hydrometry Support Facility (WMO HydroHub) Innovations Calls. This activity also includes: (a) the development an inventory of the available station equipment (including transmission techniques) and determination of the complementary equipment to be acquired (by adopting innovative technologies), including specifications and tenders for the five countries of the basin; and (b) carrying out a network optimization study to propose the pilot sites and the priority stations to reinstall, recover and/or acquire (as appropriate) and specify the equipment for each station as well as the list of works and actions to be undertaken.	Field Visits	1	5	1 000	50 000	1 512 500	1 812 500	50 000	0	0	0	0
		Assessment Study	2	5	2 000	100 000			100 000	0	0	0	0
		National Consultation Meeting	3	5	2 000	100 000			100 000	0	0	0	0
		Advisory Support	4	1	2 500	2 500			2 500	0	0	0	0
		Desk Work	5	1	10 000	10 000			10 000	0	0	0	0
	1.1.2 Rehabilitate and upgrade old stations and install new stations, including training in operation and maintenance of the stations	Equipment and Related Services	6	50	15 000	750 000	0	500 000	250 000	0	0	0	0
		Innovation Calls (New Calls) **	7	1	150 000	150 000	0	0	150 000	0	0	0	0
		Innovation Calls (solutions that will be leveraged)	8	1	50 000	50 000	0	50 000	0	0	0	0	0
		Regional Training	9	2	50 000	100 000	0	0	50 000	50 000	0	0	0
		Regional Meeting	9	2	50 000	100 000	0	50 000	50 000	0	0	0	0
1.1.3 Document and strengthen collaboration and synergies with other projects developing different monitoring methods for the local conditions (remote sensing, AI, crowdsourcing), in order to develop a catalog of innovative methods and techniques implemented in other countries or in similar conditions that could be applied in the Lake Chad basin and explore their implementation at the regional level	Contractual Services	10	1	100 000	100 000	0	0	100 000	0	0	0	0	
Output 1.2. Sustainable funding mechanism for	1.2.1 Carry out an analysis of the organizational and institutional frameworks of the NMHSs,	National Consultation Meeting/National	3	5	15 000	75 000	300 000	75 000	0	0	0	0	0

Hydromet monitoring identified	including the existing legal basis, funding and partnership arrangements, and propose a strategy for sustainable management (operation and maintenance) of monitoring networks	Working Group Meeting													
		Regional Meeting	9	1	50 000	50 000									
	1.2.2 Identify and recommend different financing models of the NMHSs - including involving private sector and stakeholders - to build value chains for hydrological and meteorological information	National Consultation Meeting/National Working Group Meeting	3	5	15 000	75 000									
		Desk Work	5	5	10 000	50 000									
Total Component 1					1 812 500	1 812 500	1 812 500	397 500	825 000	500 000	25 000	75 000	15 000		
Component 2. Development of the regional hydrometeorological information system (database and data sharing mechanism)															
Outcome 2.1. Enhanced regional cooperation for improved information systems and services with a seamless approach for use in planning and decision-making															
Output 2.1. A tailored regional interoperable database owned and managed by LCBC and NMHSs	2.1.1 Perform Quality Assessment and Quality Control of historical data of the stations of the project monitoring network in terms of availability, quality, gaps, completeness, form/format in both the national and regional databases, transfer/update of any missing data to the regional database (at regional level)	Advisory Support	4	1	2 500	2 500	302 500	822 500	2 500	0	0	0	0	0	
		Regional Training	9	1	50 000	50 000			0	50 000	0	0	0	0	
		Contractual Services	10	6	10 000	60 000			0	15 000	15 000	15 000	15 000	15 000	
		Contractual Services	10	6	10 000	60 000			0	15 000	15 000	15 000	15 000	15 000	
		Equipment and Related Services	6	6	15 000	90 000			0	90 000	0	0	0	0	
		Contractual Services	10	1	10 000	10 000			0	10 000	0	0	0	0	
Output 2.2. Appropriate data sharing agreements in place and agreed data exchanged using appropriate platforms and standards	2.2.1 Define data exchange mechanisms and procedures; update existing procedures (as required), in relation to new and innovative data and information exchange methods taking into account existing WMO data exchange and metadata registration tools (WIGOS, WIS2.0, WHOS, OSCAR)	Assessment Study	2	6	2 500	15 000	520 000		15 000	0	0	0	0		
		Contractual Services	10	1	150 000	150 000			0	50 000	50 000	50 000	0		
	2.2.2 Develop/update data sharing protocols according to WMO unified data policy taking into account the relevant agreements developed by LCBC and signed by the 5 countries, including the Water Charter that outlines the responsibilities for operation and maintenance of the regional database management system	Regional Training	9	1	50 000	50 000			50 000	0	0	0	0		
		Advisory Support	4	4	2 500	10 000			10 000	0	0	0	0		
		Regional Meeting	9	1	50 000	50 000			0	0	50 000	0	0		
		Advisory Support	4	4	2 500	10 000			0	0	10 000	0	0		
		Desk Work	5	1	10 000	10 000			0	10 000	0	0	0		
		2.2.3 Develop an inventory of existing data and metadata publication tools, web services, data formats, data and metadata standards, and vocabularies within LCBC and Member States (to complement ongoing activities in	Desk Work	5	1	10 000	10 000			0	10 000	0	0	0	

	LCBC's projects such as the Knowledge Management Platform from PROLAC project)														
	2.2.4 Implement free (and open source) data exchange tools and web services supported by WMO and conducting capacity development (to complement ongoing activities in LCBC's projects such as the Knowledge Management Platform from PROLAC project)	Contractual Services	10	6	20 000	120 000			0	0	60 000	30 000	30 000		
		Regional Training	9	2	50 000	100 000			0	50 000	0	50 000	0		
		Advisory Support	4	2	2 500	5 000			0	2 000	0	2 000	1 000		
Total Component 2						822 500	822 500	822 500	77 500	299 500	207 500	169 500	68 500		
Component 3. Identification and development of hydrometeorological products and services															
Outcome 3.1. Enabling environment created for understanding and addressing the user needs															
Output 3.1. A transboundary EWS mechanism designed, based on national needs and transboundary policies, including regional guidance and advisories by LCBC	3.1.1 Launch regional consultations to gather information and make recommendation on: (a) the effective coordination between national and transboundary policies in the context of flood and drought management and climate adaptation; and (b) the information and dissemination modes [regional consultations should be done after the national consultations in 6.1.1]	Regional Consultations	9	1	50 000	50 000	527 500	680 000	0	50 000	0	0	0	0	
		Desk work	5	5	10 000	50 000			50 000	0	0	0	0	0	
		Advisory Support	4	1	2 500	2 500			2 500	0	0	0	0	0	
	3.1.2. Launch national consultations in the five countries to gather information and make recommendations on the modes of information and dissemination to the populations (taking into account gender distinctions and their different social roles), including the most vulnerable	National Consultation Meetings/National Working Group Meeting	3	5	15 000	75 000			75 000	0	0	0	0	0	
		Advisory Support	4	1	2 500	2 500			2 500	0	0	0	0	0	
	3.1.3. Collect feedback and make recommendations at national level and needs for interconnection with transboundary policies and present recommendations to policy makers in the five participating countries [in articulation with 6.1]	Contractual Services	10	6	10 000	60 000			60 000	0	0	0	0	0	
		National Consultation Meeting/National Working Group Meeting	3	5	15 000	75 000			0	30 000	45 000	0	0	0	
	3.1.4. Revise, update, develop and document processes and protocols to monitor flood and drought in local pilot areas, at national and regional scale, as well as to act and make coordinated decisions on the development of alerts, dissemination methods, and responses	Contractual Services	10	6	10 000	60 000			60 000	0	0	0	0	0	
		Advisory Support	4	1	2 500	2 500			0	2 500	0	0	0	0	
	3.1.5. Design a transboundary EWS mechanism, including regional guidance and advisories by LCBC, taking into account a community-based approach, as well as the national needs and transboundary policies gathered under Activities 3.2.1 to 3.2.3 [Implementation is under Component 5]	Contractual Services	10	6	25 000	150 000			0	150 000	0	0	0	0	
	Output 3.2. User needs and requirements understood by NMHSs, public and private sectors	3.2.1 Organize WMO HydroHub User-provider Workshops (involving NMHSs, public and private sectors) at regional level and make detailed analysis of the diverse user groups and associated needs	Regional Meeting	9	1	50 000			50 000	152 500		0	0	50 000	0
Desk Work			5	2	10 000	20 000	20 000	0	0			0	0		
Advisory Support			4	2	5 000	10 000	10 000	0	0			0	0		
3.2.2 Produce a compilation of the respective needs and requirements from the exchanges to improve the performance of NMHSs and explore new markets for NMHSs' services		Desk Work	5	1	10 000	10 000	10 000	0	0			0	0	0	
3.2.3 Evaluate entry points for participation of different user groups as identified from their capacities, responsibilities, habits		Desk Work	5	1	10 000	10 000	0	10 000	0			0	0	0	

	for example through partnerships for data collection and sharing, updating or setting up of monitoring networks and user feedback on monitoring and EWS services in terms of quality and usefulness													
	3.2.4 Collectively (providers and users) define recommendations for cooperation and active communication to ensure that services are continuously tailored and improved	Regional Meeting	9	1	50 000	50 000			0	50 000	0	0	0	0
		Advisory Support	4	1	2 500	2 500				2 500	0	0	0	0
Outcome 3.2. Development of products and services for climate-adaptative and responsive planning and development														
Output 3.3. Climate risk assessed and services/products developed for the basin, including for food security and environmental services	3.3.1 Conduct a detailed Climate Risk Assessment of the Lake Chad Basin, including field studies, to identify vulnerability and exposure to risk factors; and create climate risk registers and catalogs disaggregating data by gender and age categories	Field Visits	1	6	2 500	15 000	627 500	1 862 500	0	10 000	5 000	0	0	0
		National Consultation Workshops/National Working Group Meeting	3	5	25 000	125 000			0	75 000	50 000	0	0	0
		Regional Training	9	1	50 000	50 000			0	50 000	0	0	0	0
		Advisory Support	4	1	2 500	2 500			0	2 500	0	0	0	0
		Contractual Services	10	1	300 000	300 000			0	0	100 000	100 000	100 000	0
	3.3.2 Training on the use and assessment of global and regional numerical weather prediction model outputs (such as quantitative precipitation forecasts), as well as sub-seasonal to seasonal meteorological forecasts, for the Lake Chad basin to help in estimating runoff/streamflow in S2S scale (feeding into HydroSOS products), and also forecast floods and droughts in the Lake Chad basin in order to improve the LCBC planning	National Training	3	5	25 000	125 000			0	0	0	125 000	0	0
	3.3.3 Disseminate information among stakeholders and assess the impacts of climate change and future risks in different sectors (including for food security and environmental services) and to gather feedback for improving products and services	Contractual Services	10	1	10 000	10 000			0	0	0	10 000	0	0
	3.3.4 Conduct a willingness-to-pay (WTP) survey among stakeholders to gather feedback on most preferred climate-related products and services which could be paid for by policy makers and community dwellers as part of sustainability considerations for DRR and food security [associated with 3.1.3, 5.2.1, 5.2.2, 6.1.2, 6.2.2]													
Output 3.4. Flood and drought forecasting tools and EWS within the riparian countries in place and coordination at regional level improved	3.4.1 Carry out a detailed analysis of hydrological forecasting tools and EWS (related to floods and droughts) within the participating countries and at the regional level, with a view of determining possible upgrades of the existing systems and mechanisms for a state-of-the-art (impact-based) EWS	Regional Meeting	9	1	50 000	50 000	575 000		50 000	0	0	0	0	0
		Equipment and Related Services	6	1	50 000	50 000			0	50 000	0	0	0	0
		National Consultation Meeting	3	5	15 000	75 000			75 000	0	0	0	0	0
		Assessment Study	2	6	10 000	60 000			60 000	0	0	0	0	0
		Contractual Services	10	1	50 000	50 000			0	0	50 000	0	0	0
		Equipment and Related Services	6	1	50 000	50 000			0	0	50 000	0	0	0
		Advisory Support	4	2	2 500	5 000			0	0	5 000	0	0	0
		Regional Training	9	1	50 000	50 000			0	0	50 000	0	0	0
	3.4.2 Structure the processes to scale up the use of meteorological and hydrological observation and monitoring methods based on remote sensors (e.g. satellite altimetry, Raincell) applied in Chad, and analyze the feasibility of such methods in pilot areas of Lake Chad [in articulation with 1.1.5]	Contractual Services	10	1	30 000	30 000			0	30 000	0	0	0	0
	3.4.3 Undertake extreme value analysis for the determination of													

	flood and drought risk thresholds for the various hazard-prone areas of the Lake Chad basin, as well as thresholds based on historical events in consultation with technical services and local representatives	Advisory Support	4	1	2 500	2 500			0	2 500	0	0	0
	3.4.4 Develop a flow forecasting information system for the Lake Chad basin taking into account various available and existing models; and establish a framework for comparison and analysis of information adapted to forecasters and operators	Contractual Services	10	1	100 000	100 000			0	0	30 000	50 000	20 000
		Regional Training	9	1	50 000	50 000			0	0	50 000	0	0
		Advisory Support	4	1	2 500	2 500			0	0	2 500	0	0
Output 3.5. A framework for the production and sharing of hydrological status assessments and outlook products in place to inform water resource management	3.5.1 Apply the Global Hydrological Status and Outlook System (HydroSOS) concept, standards and tools, explore the improvement and the development of products based on available Hydromet information (in situ and remotely sensing data), if available local models and downscaling of global models to provide a comprehensive overview of the state of the basin's water resources as well as the hydrological outlook for the coming weeks and months (seasonal to sub-seasonal time scales)	Regional Meeting	9	3	50 000	150 000	660 000		50 000	0	0	50 000	50 000
		National Stakeholders Workshops/National Working Group Meeting	3	5	20 000	100 000			100 000	0	0	0	0
		Advisory Support	4	3	2 500	7 500			2 500	2 500	0	2 500	0
		Contractual Services	10	2	50 000	100 000			0	100 000	0	0	0
	3.5.2 Update/set up a web portal to disseminate the Lake Chad basin related HydroSOS products (at country and regional level and to the HydroSOS global portal)	Contractual Services	10	1	137 500	137 500			0	0	137 500	0	0
	3.5.3 Sensitize and train NMHSs, national and regional institutions and research centers on the different uses of Lake Chad Basin water resources information. Produce easy-to-digest (or understandable) bulletins (as outputs of HydroSOS portals) for hydrological status and outlooks based on the user requirements, to assist users and policy makers in decision making	Regional Hydrological Outlook Forum or similar HydroSOS event	10	2	80 000	160 000			0	0	0	80 000	80 000
		Advisory Support	4	2	2 500	5 000			0	0	0	2 500	2 500
Total Component 3					2 542 500	2 542 500			627 500	617 500	625 000	420 000	252 500
Component 4. Training of project stakeholders and knowledge development													
Outcome 4.1. Strengthened institutional and human capacities at regional and national levels to operate and maintain the infrastructure and tools made available through the project													
Output 4.1. Organizational arrangements at a national and regional levels and development plans prepared and implemented	4.1.1 Undertake an assessment of existing operating procedures and human resources capacities for Hydromet monitoring and data management making use of the WMO HydroHub Capacity and Needs Assessment; and in collaboration with all relevant stakeholders, develop recommendations and a proposal for an organizational reform strategy with an action plan to enhance institutional arrangements in the five countries of the Lake Chad basin	Field Visits	1	6	2 500	15 000	287 500	805 000	15 000	0	0	0	0
		Assessment Study	2	6	10 000	60 000			60 000	0	0	0	0
		National and Regional Consultation Meetings/National Working Group Meeting	3/9	6	15 000	90 000			0	90 000	0	0	0
		Advisory Support	4	1	2 500	2 500			0	1 500	1 000	0	0
		Contractual Services	10	6	10 000	60 000			0	30 000	30 000	0	0
	4.1.2 Develop a needs-based training programme and action plan for staff from national and regional institutions and deliver tailored training for the development of project activities	Desk Work	5	6	10 000	60 000			0	60 000	0	0	0
Output 4.2. Hydromet staff is trained in monitoring, information systems and service	4.2.1 Train/reskill relevant NMHSs and LCBC staff in installation, maintenance and management of monitoring stations, including	Regional Training	9	1	50 000	50 000	517 500		50 000	0	0	0	0
		Advisory Support	4	6	2 500	15 000			2 500	0	0	12 500	0
		National Training	3	5	25 000	125 000			0	0	0	125 000	0

Table 26b. Description of the budget notes.

Budget Note Number	Budget Type Cost	Budget Cost Description
1	Field Visits	<ul style="list-style-type: none"> - Cost of 1 local/national staff and 1 consultant travel and per diem for conducting field survey of the stations (daily rate: 800 USD per station) - National consultant fee (daily rate: 100 USD per day; 2 days per station)
2	Assessment Study	<ul style="list-style-type: none"> - Cost of Technical Assistance (daily rate: 250 USD per day; 4 days per station) to define what's required from the field visits and to guide the development of the assessment - National consultant fee (daily rate: 100 USD per day; 10 days per station) to prepare an inventory of all stations with metadata, develop a log with all the problems of each station, and prepare technical specifications to rehabilitate or replace with a new station
3	National and Community Consultation Meeting / Workshop / Training/ National working Group meetings	<ul style="list-style-type: none"> - Logistical expenses for the meetings/ workshops / trainings including room rental, WIFI, food, etc. (rate varies depending on numbers of participants, location and duration) - Transportation costs for participants (travel and DSA for out-of-town participants, and local transportation for local participants) - Incidental expenses such as stationery, printers, etc - Outreach and communication materials - Facilitator/ trainer daily fee (250-500 USD per day for regional-international expert) and travel costs, as relevant <p>National working Group meetings will be carried out in association with the implementation of the activity.</p>
4	Advisory Support	Advisory support in various subject areas (daily rate: 250-500 USD per day for regional-international consultants; to be hired for 5-10 days depending on the subject and need)
5	Desk Work	<ul style="list-style-type: none"> - Costs includes fee for national, regional or international consultant depending on the subject and need (National consultant daily rate: 100 USD per day; Regional consultant daily rate: 250 USD per day; and International consultant daily rate: 500 USD per day, considering the experience and skills required) - Technical Assistance from expertise for the development of various deliverables - Outreach and communication for designing and layout of deliverables - Material costs including the purchase of e.g. topographic or satellite maps, satellite data, etc.
6	Equipment and Related Services	<p>Procurement and installation of equipment and implementation of related services (e.g. Hydromet Stations, spare parts, calibration, installation, civil works and other related costs, Servers, UPS, personal computers, communication network and other ICT-related equipment, O&M costs; guards to look after the stations and avoid vandalism). Estimated costs for units below:</p> <p>1 Hydromet station: 15 000 USD (including civil works, e.g. fence to protect against vandalism)</p> <p>O&M costs: 900 USD per station (including transportation (e.g. vehicle rentals for measurements/installation visits), allowances, and other associated costs)</p> <p>1 PC: 2 000 USD</p> <p>1 server: 8 500 USD</p> <p>1 UPS: 3 000 USD</p>
7	Innovation Calls (New Calls) **	Procurement and installation of equipment and implementation of related services (e.g. Hydromet Stations or parts; solutions that could contribute to reduce vandalism of stations)
8	Innovation Calls (solutions that will be leveraged)	Procurement and installation of equipment and implementation of related services (e.g. Hydromet Stations or parts)
9	Regional Training / Regional Meeting	<ul style="list-style-type: none"> - Trainer/Facilitator travel (economy class tickets via train/flight, per diem) and daily fee (250-500 USD per day for regional-international expert) - Travel and DSA of local/national participants and project staff (total of 25-35 participants) - Incidental expenses such as stationery, printers etc. - Outreach and Communication material - Logistical costs to organize the meeting such as training centre rent, transportation cost to the training centre, enhanced WIFI etc.
10	Contractual Services	<ul style="list-style-type: none"> - Contracts with specialized institutions/agencies/NGOs for execution or supervision or technical support and oversight of the activities (estimated number of days differ depending on the activity and international/regional/national/sub-national organization - Includes travel costs (when applicable) and expert service fee for technical assistance, installation and maintenance of equipment's or infrastructures, services, etc. - it may include small equipment for communities as such as signals for communication, etc.

Table 27. Breakdown of the Project Cycle Management Fee charged by the Implementing Entity.

Implementing Entity Fee Breakdown			
Activities	Responsibilities	Total (USD)	Notes
Overall coordination and management with Adaptation Fund Secretariat; management of project implementation with the Executing agencies and project development	Project Coordinator/Manager (60% of P3 = 155'000/year x 5 years)	465 000	Project Coordinator/Manager will be based in the region (either WMO Regional Office or LCBC, TBC)
Financial management, including accounting and grant management to Executing entities and third parties, <u>including administrative support (consultant and staff contract management, procurement, legal and travel support)</u>		124 000	
Information and communication management		50 000	
Quality assurance including internal and external audits		56 000	2 times per year; each time at 5 600 USD
Participation of WMO staff and technical experts to the project activities and Project Steering Committee meetings (organization/logistics and WMO staff)		80 000	
Monitoring and Evaluation	Baseline data report and associated work	25 000	This includes any required travel (5 000 USD) and engagement of independent experts (20 000 USD)
	Mid-term Review (MTR) report and associated work	50 000	This includes any required travel (10 000 USD) and engagement of independent experts (40 000 USD)
	Final Project Evaluation and associated work	50 000	This includes any required travel (10 000 USD) and engagement of independent experts (40 000 USD)
TOTAL (USD)		900 000	

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Table 28. Breakdown of the Project Execution costs.

Executing Fee breakdown			
Entity	Execution activity	Total cost (USD)	Notes
LCBC	Inception meeting, including launch of activities	75 000	Planned for launching the project with country partners and stakeholders, including facilitation costs
LCBC	Project Steering Committee meetings (country participants)	60 000	Planned to be held yearly through face-to-face meetings in the region (years 1, 3 and 5) or virtual meetings (years 2 and 4). Cost estimate for country participants: 20 000 USD per meeting; try to have it back-to-back with other activities
LCBC	Project coordination and management	400 000	Staff costs in LCBC: 80 000 USD/year for 2 project technical officers and for regional staff
LCBC	Administration (including finance management, audits, etc.) and communication costs	80 000	
GWP-CAF	Project coordination and management	200 000	Staff costs in GWP-CAF: 40 000 USD/year for project technical officer and for regional staff
GWP-CAF	Administration (including finance management, audits, etc.) and communication costs	40 000	
TOTAL (USD)		855 000	

H. Include a disbursement schedule with time-bound milestones.

The disbursement schedule (based on the detailed budget provided in **Table 26a**) is provided in **Table 29**.

Table 29. Project Disbursement Matrix

	Upon signature of the Agreement	One year after Project Start	Year 3	Year 4	Year 5	TOTAL (USD)
Schedule date	Jul 2024	Jul 2025	Jul 2026	Jul 2027	Jul 2028	
Project Funds (USD)	1'466'500	2'876'900	2'202'200	1'620'700	833'700	9'000'000
IE Fees (10%) (USD)	190'000	165'000	190'000	165'000	190'000	900'000
EE Fees (9.5%) (USD)	239'000	144'000	164'000	144'000	164'000	855'000
TOTAL (USD)	1'895'500	3'185'900	2'556'200	1'929'700	1'187'700	10'755'000

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PART IV: ENDORSEMENT BY GOVERNMENTS AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. Record of endorsement on behalf of the government³

Mr. Theophile Herve ABA'A ATEBA Sub Director for Environmental Economy Ministry of Environment, Nature Protection and Sustainable Development Yaoundé CAMEROON	Date: June 26, 2023
Mr. Boris Bemokolo Head of Studies, Climate Change Innovation Fund National Climate Coordination/ Ministry of the Environment and Sustainable Development Bangui CENTRAL AFRICAN REPUBLIC	Date: June 11, 2023
Mr. Porgo Hounly Focal point Adaptation Fund Ministry of the Environment, Water and Fisheries N'Djamena CHAD	Date: June 22, 2023
Dr. Kamayé Maâzou Executive Secretary National Council for Environment and Sustainable Development Niamey NIGER	Date: July 6, 2023
Dr. Salisu Dahiru Director National Council of Climate Change Federal Ministry of Environment Abuja NIGERIA	Date: July 5, 2023

⁶ Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

B. Implementing Entity certification

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans of Cameroon, Central African Republic, Chad, Niger and Nigeria and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.

Moyenda Chaponda
Project Officer
Project Management and Implementation
Member Services and Development Department, WMO
Implementing Entity Coordinator

Date: [January 16, 2024](#)

Tel. and email: +41227308646,
mchaponda@wmo.int

Project Contact Person: Scientific Officer Johanna Korhonen

Tel. And Email: +41 22 730 84 70 jkorhonen@wmo.int

Annexes:

1. Cost-Benefit Analysis
2. Summary of the technical meetings
3. ESIA report and plan
4. Gender report and action plan
5. Regional Workshop (Mar 2023) report

REPUBLIQUE DU CAMEROUN
Paix – Travail – Patrie

MINISTERE DE L'ENVIRONNEMENT,
DE LA PROTECTION DE LA NATURE ET
DU DEVELOPPEMENT DURABLE

SECRETARIAT GENERAL

DIRECTION DE LA PROMOTION DU
DEVELOPPEMENT DURABLE



REPUBLIC OF CAMEROON
Peace – Work – Fatherland

MINISTRY OF ENVIRONMENT,
PROTECTION OF NATURE AND
SUSTAINABLE DEVELOPMENT

SECRETARIAT GENERAL

DEPARTMENT OF PROMOTION OF
SUSTAINABLE DEVELOPMENT

N° 001 /LMINEPDED/SG/DPDD/SDECO/PF-FA

Yaounde, 12 6 JUN 2023

To:
The Adaptation Fund Board
C/O Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement of the Project Proposal: Integrated Water Resources Management and Early Warning System for Climate Change Resilience in the Lake Chad Basin

In my capacity as designated authority for the Adaptation Fund in Cameroon, I confirm that the above regional grant proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Lake Chad Basin.

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by the World Meteorological Organization (WMO) and executed by the Lake Chad Basin Commission (LCBC) and the Global Water Partnership Central Africa (GWP-CAF).

Cameroon acknowledges that implementing entities do not usually execute activities in Adaptation Fund projects. Nevertheless, we kindly request the Adaptation Fund Board to approve, under exceptional basis, the execution of the WMO HydroHub Innovation Calls by WMO. These activities fall within the budget limits for implementing entities to execute under exceptional basis. This request is based on the fact that the process for implementation of WMO HydroHub Innovation Calls has been established and managed by WMO. The process follows WMO procurement and rules, and evaluation follows the selection/eligibility criteria defined by WMO in order to meet the standards set by this organization and ensure consistency with all innovation calls of WMO.

Yours Sincerely

Mr Theophile Herve ABA'A ATEBA; BSc (Hons)
Industrial Chemical and Environmental Engineer,
Sub Director for Environmental Economy,
Ministry of the Environment, Nature Protection and Sustainable Development
P.O Box 320, Yaoundé, Cameroon
Tél. : + 237 699 35 81 28 ; + 237 677 46 01 45
Email : theophile.abaa@gmail.com



Bangui, le 11 Juin 2023

Letter of Endorsement by Government

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement of the project proposal entitled "Integrated water resources management and early warning system for climate change resilience in the Lake Chad Basin"

In my capacity as designated authority for the Adaptation Fund in Central African Republic (CAR), i confirm that the above regional grant proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Lake Chad Basin.

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by the World Meteorological Organization (WMO) and executed by the Lake Chad Basin Commission (LCBC) and the Global Water Partnership Central Africa (GWP-CAf).

Central African Republic acknowledges that implementing entities do not usually execute activities in Adaptation Fund projects. Nevertheless, we kindly request the Adaptation Fund Board to approve, under exceptional basis, the execution of the WMO HydroHub Innovation Calls by WMO. These activities fall within the budget limits for implementing entities to execute under exceptional basis. This request is based on the fact that the process for implementation of WMO HydroHub Innovation Calls has been established and managed by WMO. The process follows WMO procurement and rules, and evaluation follows the selection/eligibility criteria defined by WMO in order to meet the standards set by this organization and ensure consistency with all innovation calls of WMO.

Sincerely,

Mr Boris Bemokolo

Head of Studies, Climate Change Innovation Fund
National Climate Coordination/Ministry of the Environment and Sustainable Development,
Bangui, Central African Republic
Tel: +236 75 09 63 25
Email: borisbemokolo@yahoo.fr



Republic of Chad
Interim Presidency
Prime Ministry
Ministry of Environment, Fishery and Sustainable Development
General Directorate of the Ministry
National Designated Authority
N° 003 /RC/IP/PM/MEFSD/DGM/AND/2023



ADAPTATION FUND

Letter of Endorsement by Government

The National Designated Authority

N'Djamena, June 22th 2023

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement of the project proposal entitled "Integrated water resources management and early warning system for climate change resilience in the Lake Chad Basin"

In my capacity as designated authority for the Adaptation Fund in Cameroon, I confirm that the above regional grant proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Lake Chad Basin.

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by the World Meteorological Organization (WMO) and executed by the Lake Chad Basin Commission (LCBC) and the Global Water Partnership Central Africa (GWP-CAF).

Cameroon acknowledges that implementing entities do not usually execute activities in Adaptation Fund projects. Nevertheless, we kindly request the Adaptation Fund Board to approve, under exceptional basis, the execution of the WMO HydroHub Innovation Calls by WMO. These activities fall within the budget limits for implementing entities to execute under exceptional basis. This request is based on the fact that the process for implementation of WMO HydroHub Innovation Calls has been established and managed by WMO. The process follows WMO procurement and rules, and evaluation follows the selection/eligibility criteria defined by WMO in order to meet the standards set by this organization and ensure consistency with all innovation calls of WMO.

Sincerely,



Mr Porgo Hounly
Focal point Adaptation Fund
Ministry of the Environment, Water and Fisheries
N'djamena, Chad
Tél. : +235 66 10 10 27
Email : porgohounly@yahoo.fr

REPUBLIQUE DU NIGER



Fraternité –Travail- Progrès

CABINET DU PREMIER MINISTRE



CONSEIL NATIONAL DE L'ENVIRONNEMENT
POUR UN DEVELOPPEMENT DURABLE

SECRETARIAT EXECUTIF

Letter of Endorsement by Government

06 Juillet 2023

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement of the project proposal entitled "Integrated water resources management and early warning system for climate change resilience in the Lake Chad Basin"

In my capacity as designated authority for the Adaptation Fund in Cameroon, i confirm that the above regional grant proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Lake Chad Basin.

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by the World Meteorological Organization (WMO) and executed by the Lake Chad Basin Commission (LCBC) and the Global Water Partnership Central Africa (GWP-CAF).

Cameroon acknowledges that implementing entities do not usually execute activities in Adaptation Fund projects. Nevertheless, we kindly request the Adaptation Fund Board to approve, under exceptional basis, the execution of the WMO HydroHub Innovation Calls by WMO. These activities fall within the budget limits for implementing entities to execute under exceptional basis. This request is based on the fact that the process for implementation of WMO HydroHub Innovation Calls has been established and managed by WMO. The process follows WMO procurement and rules, and evaluation follows the selection/eligibility criteria defined by WMO in order to meet the standards set by this organization and ensure consistency with all innovation calls of WMO.

Sincerely,

Dr. Kamaye Maazou
Executive Secretary,
National Council for Environment and Sustainable Development
P.O. Box: 10193, Niamey, Niger
Tél: +227 20722559
E-mail: kamayemaazou@yahoo.fr





FEDERAL REPUBLIC OF NIGERIA

NATIONAL COUNCIL ON CLIMATE CHANGE (NCCC)

Address: Plot 464 Iya Abubakar Crescent, Opp Alex Ekweme Way,
by Jabi Lake, Jabi, Abuja, FCT
Email: info@natccc.gov.ng

Ref;NCCC/HQ/I/003/1

5TH July 2023

Letter of Endorsement by Government

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: Endorsement of the project proposal entitled "Integrated water resources management and early warning system for climate change resilience in the Lake Chad Basin"

In my capacity as designated authority for the Adaptation Fund in Nigeria, I confirm that the above regional grant proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Lake Chad Basin.

Accordingly, I am pleased to endorse the above grant proposal with support from the Adaptation Fund. If approved, the project will be implemented by the World Meteorological Organization (WMO) and executed by the Lake Chad Basin Commission (LCBC) and the Global Water Partnership Central Africa (GWP-CAf).

Nigeria acknowledges that implementing entities do not usually execute activities in Adaptation Fund projects. Nevertheless, we kindly request the Adaptation Fund Board to approve, under exceptional basis, the execution of the WMO HydroHub Innovation Calls by WMO. These activities fall within the budget limits for implementing entities to execute under exceptional basis. This request is based on the fact that the process for implementation of WMO HydroHub Innovation Calls has been established and managed by WMO. The process follows WMO procurement and rules, and evaluation follows the selection/eligibility criteria defined by WMO in order to meet the standards set by this organization and ensure consistency with all innovation calls of WMO.

Sincerely,

Dr. Salisu Dahiru
Director General,
National Council on Climate Change,
Plot 464 Iya Abubakar Crescent Jabi Lake,
Abuja-Nigeria

ANNEX 1 - SOCIO-ECONOMIC BENEFITS OF IMPROVED HYDROMETEOROLOGICAL SERVICES AND EARLY WARNING SYSTEMS IN THE LAKE CHAD BASIN

A1.1 Introduction

For a potential public investment by the project to be justified, the socioeconomic benefits it will produce should be compared to the costs involved. The application of cost-benefit analysis to modernizing hydrometeorological services was explored in [WMO et al. \(2015\)](#), which also outlined different methodologies (and challenges) for quantifying benefits and costs related to weather, climate, and water-related information and services. This study found that in general, investing 1 USD in hydrometeorological services and early warning systems (EWS) results in 2 to 36 USD in socioeconomic benefits (defined as a range from 2:1 to 36:1 benefit/cost ratio).

A1.2 Conservative Approach

Cost-benefit analysis for disaster and hydromet-related risk management is often challenged by a lack of data and information. In addition, there are several complexities and uncertainties inherent in quantifying disaster risk management that are compounded by climate change. Cost-benefit analysis is also challenged in handling intangibles and—of particular importance for extreme events—in discounting future impacts. Therefore, to build confidence in and robustness of a cost-benefit analysis of hydrometeorological services, a transparent and conservative approach is necessary ([Kull, Mechler, and Hochrainer, 2013](#)). The methodology used in this paper, and all assumptions and their supporting analyses are described below. Where a range of potential analysis inputs is generated, the most “conservative” values are taken, meaning that for a range of potential benefits the lowest value is used. This approach results in the analysed net present value and benefit/cost ratio representing the lowest threshold of expected economic effectiveness; most likely the truly realized economic efficiency will be greater than what is reported here.

The three key conservative assumptions taken in this study are:

1. The analysis does not consider future population growth or population movement, and development that will be protected by a potential investment; the economy at risk is considered the same as the most recent World Bank data available on Gross Domestic Products (GDPs) (**Table A1.2.1**).
2. Only reductions in the short-term direct impacts of weather-, water- and climate-related processes are considered; long-term indirect impacts (such as in health) are not included.
3. Disaster risk is based on past experience and therefore does not consider the potential impacts of climate change.

As indicated above, these assumptions contribute to a conservative estimate of the investment’s economic effectiveness.

Table A1.2.1. 2022 GDPs of Cameroon, Central African Republic, Chad, Niger and Nigeria ([WB, 2023](#), accessed on 30 December 2023).

Country	GDP (USD; million)	Reference year
Cameroon	43,644.07	2022
Central African Republic (CAR)	2,382.62	2022
Chad	12,704.15	2022
Niger	15,342.28	2022
Nigeria	472,624.60	2022
Total (Lake Chad Basin)	546,697.72	2022

A1.3 Benefits from Avoided Disaster Losses

Considering the stochastic nature of disasters, common practice for cost-benefit analysis of disaster risk management is to determine the average annual losses due to disasters ([Kull, Mechler, and Hochrainer, 2013](#)). This represents the averaging of all potential losses over time to quantify the expected economic burden per year. When sufficient data are available, the average annual loss is calculated as the area under a loss frequency curve, which is a common metric indicating the exceedance probability of the full potential range of losses per year (for example from the yearly flood to the 100- or 200-year flood).

Tables A.1.3.1 and A.1.3.2 provide, respectively, the total loss and the average annual loss (AAL) in thousand USD, for the main hydrometeorological hazards (i.e. floods and droughts) in the five countries of

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the Lake Chad Basin, namely Cameroon, Central African Republic (CAR), Chad, Niger and Nigeria, during the period 1960-2022. These data are for the whole countries, but project interventions are only for Lake Chad Basin.

Table A.1.3.1. Total Loss in thousand USD for the main hydromet-related hazards in the Lake Chad Basin countries, 1960-2022 (EM-DAT, 2023)

Country	TOTAL (USD; thousand)*
Cameroon	28,390
Central African Republic (CAR)	402
Chad	676,952
Niger	372,891
Nigeria	5,751,751
Total (Lake Chad Basin)	6,815,386

* Adjusted according to the Consumer Price Index (CPI).

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Table A.1.3.2. Average Annual Loss (AAL) in thousand USD for the main hydromet-related hazards in the Lake Chad Basin countries (EM-DAT, 2023)

Country	TOTAL (USD; thousand)*
Cameroon	458
Central African Republic (CAR)	7
Chad	10,919
Niger	6,014
Nigeria	92,770
Total (Lake Chad Basin)	110,168
Percent of Total GDP	0.021

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A1.3.1 Benefits from Reduced Disaster Losses

[Subbiah, Bildan, and Narasimhan \(2008\)](#) provides guidance on the level of damage reduction that can be achieved through early warning systems, which ranges from 5 percent to 90 percent, depending on the items at risk and provided lead times. While a 20 percent reduction is often assumed as an average reduction in economic losses attributable to early warning, contextually relevant experience indicates a more conservative range of 5–10 percent is more appropriate. In line with the conservative approach set out for this analysis, the lower end of the range of global experience (5 percent) is applied. Out of total annual damages due to hydrometeorological hazards of 6,815,386 thousand USD, improved forecasting and early warning can potentially eliminate some 340,769 thousand USD.

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Considering the limited data availability, a benchmarking methodology is here employed to verify the results, following [Hallegatte \(2012\)](#) and based on a region's GDP. [Hallegatte \(2012\)](#) found that on average, well-functioning, modern EWS reduce disaster-related asset damages by between 0.003 percent and 0.017 percent of GDP. The study therefore concludes that the potential benefit of an investment in any element of the EWS value chain is the difference between the current protection provided by the existing systems and the potential reduction in asset damages if the systems are modernized.

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Under this benchmarking methodology, the Lake Chad Basin countries (namely, Cameroon, Central African Republic, Chad, Niger and Nigeria) would be considered a lower-middle-income countries with relatively modest systems and would therefore be assumed to currently capture only 20 percent of the potential damage reduction benefits of hydromet early warning. Potential benefits would thus be calculated as the difference between the potential reduced losses — between 0.003 percent and 0.017 percent of GDP, assuming these five countries correspond to the global benchmark — and the actual reduced losses, which in this case would be 20 percent of that value. The results for the Lake Chad Basin range from 3.09 to 17.52 million USD in average annual reduced losses.

The benchmarking methodology indicates that estimates of annual benefits from reduced flood and drought losses are of a similar order of magnitude of the higher value. Recognizing some discrepancies, likely due to the Lake Chad Basin countries being less or more exposed to hydrometeorological hazards than the global average, a sensitivity analysis is also pursued to identify the impact of reduced benefits on the overall economic assessment.

A1.3.2 Benefits from Increased Production

In addition to diminishing disaster losses, modernized hydromet systems can significantly enhance economic productivity. Because information is lacking, a benchmarking approach is used to estimate potential benefits to economic productivity from modernized hydromet services in the Lake Chad Basin countries.

[Hallegatte \(2012\)](#) finds that about 25 percent of the world GDP is generated in weather-, water- and climate-sensitive sectors, i.e., agriculture, water resource management, energy, construction, and transport. Modernized hydromet and warning systems can benefit these sectors in many ways, ranging from immediate warnings and seasonal advisories to infrastructure design and spatial planning. A conservative global benchmark is that modern hydromet services add value of 0.1 percent to 1 percent in weather- and climate-sensitive sectors, which would translate into gains of approximately 0.025 percent and 0.25 percent of global GDP.

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In the Lake Chad Basin countries, weather-, water-, and climate-sensitive sectors represent at least 25 percent of the countries' economies for agriculture; but this may be even higher as there are other sectors of the society that are also weather-, water- and climate-sensitive. Applying the [Hallegatte \(2012\)](#) benchmarking approach, results in annual benefits in production of 128.85–1,288,46 million USD per year. To avoid double-counting and again pursuing a conservative approach, the lower end of the range (i.e., 128.85 million USD) is used in this analysis. However, considering the frequency of droughts and floods in these five countries, this must be considered extremely conservative.

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A1.3.3 Total Annual Benefits

As indicated above, the benefits attributed to improved hydrometeorological services for this analysis are based on the lower end of the ranges, i.e., 3.09 million USD for the reduced disaster losses due to hydromet hazards, and 128.85 million USD for the increased productivity, in a total of 131.94 million USD per year in the five countries as the project addresses improvements throughout the hydromet value chain. However, this proposed project focuses on improving hydromet services and early warning systems on the Lake Chad Basin portion of the countries that represents 40.28 percent of the total area of the five countries; therefore, representing 40.28 percent of the potential benefits of a system that cover the whole five countries' area, i.e. 53.15 million USD.

A1.4 Cost-Benefit Analysis (Regional versus National)

For this regional project, there is a proposed investment of 10.69 million USD, of which 3.750 million USD are for regional activities and management. These activities relate to aspects that all five countries face, and therefore joint capacity building will reduce the total cost of ownership, which includes both the capital investment and the operation and maintenance costs. If these activities are done nationally, they need to be replicated in each country and therefore the capital investment would need to be quintuple, i.e. instead of 3.750 million USD, it would be required 18.750 million USD. In the individual country scenario, there would be a need for 25.62 million USD to carry out the same activities and apply the same tools in the five countries. On top of this, building the capacity at the regional level, it reduces by half the operation and maintenance costs from 12% of the total investment to 6% of the total investment ([WB, 2022](#)), as there is expertise in the region.

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Benefits in terms of reduced disaster damages and increased production are assumed to remain the same in both regional and national scenarios, and increase linearly after the first project year, reaching full benefits the year after program completion. However, it is well known that weather and climate have no borders and therefore transboundary events can be better monitored and forecast there are harmonization of warning thresholds, etc. This aspect has not been quantified in this study, but it must not be neglected.

Comparing the costs and benefits of the project over time can show the relative value of the planned investments. While cost-benefit analysis provides a useful process and resultant metrics to help steer investment decision making, it should not be the only factor considered as there are a number of assumptions made, especially when we compare regional versus national investments.

While the implementation spans over 5 years, this analysis assumes that the project impact is 15 years, as this is based on the average life cycle of the infrastructure (hydrometeorological equipment). Investment disbursements are described in Table 29 of the project proposal. Additional O&M costs (6% of the total investment for a regional project) increase linearly as cumulative project investments are made, reaching a constant maximum after the fifth year of the project investments are completed. Benefits in terms of reduced disaster damages and increased production are also assumed to increase linearly, starting to be realized from the second year and reaching a constant maximum the year after the fifth year of the project investments are completed. A comparison is also done of regional versus national investments (see **Table A1.4.1** and **Figure A1.4.1a** and **A1.4.1.b**).

Cost-benefit analysis uses a discount rate to represent societal preference for consuming in the present as opposed to saving and consuming in the future. A discount rate of 0 percent indicates no preference between

now and in the future, while a discount rate of 15 percent represents a high preference for spending now. In this analysis a discount rate of 5 percent is applied (usually applied in CBA of hydromet investments), representing an understanding that future costs and benefits are relatively important in comparison to the current situation (in keeping with concerns regarding climate change). However, 0 percent to 15 percent discount rates are also applied for sensitivity analysis. **Table A1.4.1** shows the results of the analysis for the following cost-benefit metrics:

- **Net present value:** Present benefits minus present costs. If the net present value is greater than 0.0, then the investment is considered economically effective.
- **Benefit/cost ratio:** Present benefits divided by present costs. If the benefit/cost ratio is greater than 1.0, then the investment is considered economically effective.

In both the regional and national investments scenarios, the cost-benefit analysis indicates that the investment is economically efficient, meaning they will produce socioeconomic benefits greater than their costs. The generated benefits are significantly greater than the costs: 35:1 for the regional investment scenario; and 10:1 for the national investments' scenario at 0% discount rate; and 28:1 for the regional investment scenario; and 9:1 for the national investments' scenario at 5% discount rate. However, there are much higher socioeconomic benefits in the case of the regional scenario (35 USD against 10 USD for 1 USD investment at 0% discount rate; 28 USD against 9 USD for 1 USD investment at 5% discount rate).

Table A1.4.1. Cost-benefit analysis results

A1.4.1a Proposed Regional Investment								
	Net present value (million USD)				Benefit/cost ratio			
Discount rate	0%	5%	10%	15%	0%	5%	10%	15%
Benefits	619	395	264	184	35	28	24	20
A1.4.1b National Investments								
	Net present value (million USD)				Benefit/cost ratio			
Discount rate	0%	5%	10%	15%	0%	5%	10%	15%
Benefits	574	362	239	164	10	9	8	7

The importance of reliable long-term budget availability is reflected in **Figures A1.4.1a** and **A1.4.1b**, which shows the first 10 years of financial and economic flows, assuming "realistic" benefits and a discount rate of 5 percent, for both the regional and the national investments scenarios. The first year of investments in both scenarios result in a negative net present value, but as more and more investments come online, the net present value becomes positive, despite increased operations and maintenance costs. However, the net present value is lower in case of the national investments' scenario, being nearly zero on the second year meaning that the investment is still not economically effective, while for the regional investment scenario, the investment is economically effective as the net present value is clearly positive.

Once the project is completed (in Year 5), the annual costs and benefits remain constant for both scenarios, with the cumulative net present value significantly increasing year on year; however, the costs are higher for the national investments' scenario due to higher operation and maintenance costs. In both cases, the relatively small operations and maintenance costs leverage the investment to deliver significant benefits far into the future.

Considering the very conservative approach and assumptions applied throughout the analysis, the results are considered robust. [Hallegatte et al. \(2017\)](#) found that globally, universal access to hydromet services and EWS would almost double the benefits of reducing asset losses by also reducing "well-being" losses. These less tangible well-being benefits — for example, contributions to poverty reduction — are not considered in this analysis, again suggesting that the analysis very likely underestimates the benefits from the proposed investments. In addition, the saving of lives, which is a primary benefit of EWS, is not considered in the analysis. This is omitted due to the moral implications and sensitivities of assigning economic values to human lives, even with "neutral" approaches such as value of a statistical life (VSOL). This omission further contributes to the conservative nature of the analysis.

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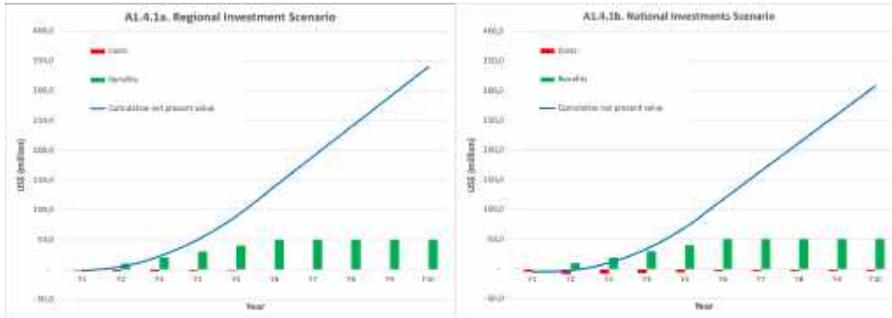


Figure A1.4.1. Annual financial and economic flows of investment with benefits and 5 percent assumed discount rate

As the Lake Chad Basin population and economic productivity grows, hydromet services and EWS will continue to provide benefits. New developments and investments will also benefit from improved hydromet and early warning services, as opposed to structural flood control, where new levees may need to be built to protect new developments. The fact that these two factors (climate change and population/economic growth) were not incorporated in the analysis again points to an underestimation of the actual program benefits.

Calculations available at the [Excel file](#).

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ANNEX 2 – SUMMARY OF THE TECHNICAL DISCUSSIONS

A2.1 Introduction

Consultation is the process of gathering information or advice from stakeholders and taking their views into account when making project decisions and/or setting targets and defining strategies. From December 6, 2022 to January 13, 2023, stakeholder consultations with government entities responsible for the technical aspects were conducted online to understand their existing challenges and needs in order to confirm the baseline, collect their opinions and comments on the project, as well as suggestions and recommendations that could improve the technical aspects of the project.

All government entities expressed the importance and timeliness of this project, and very much support all the proposed activities. Below, there is a summary of the aspects discussed, which were considered in the design of the proposed project.

A2.2 List of people virtually met per country and Date of the meeting

Cameroon (meeting on December 19, 2022):

- Ms Tenga Mbeh Aurelie Pierre (LCBC Focal Point)
- Mr Tchinda (National Meteorological Service and Permanent Representative of Cameroon with WMO)
- Ms Christelle (National Meteorological Service)
- Mr Jean Claude Ntonga (National Hydrological Service)
- Ms Johanna Korhonen (WMO Secretariat)
- Ms Alice Soares (Lead Consultant, WMO)
- Mr Alio Abdoulaye (LCBC)
- Ms Marthe Mintsa (LCBC)



Central African Republic (CAR) (meeting on January 12, 2023):

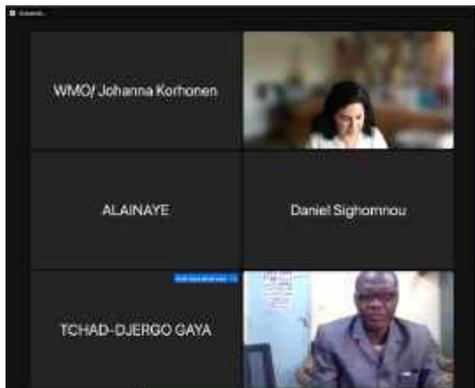
- SOULE BAORO Gildas (Director General of the Environment)
- FALIBAI Barnabé (Director General of Hydraulic Resources)
- LELON YALI Aymard Rodrigue (Director General of Meteorology)
- MOLEKPO Gilbert (Director General of Sustainable Development)
- SEMBENE Pierre (Director of Water, Fisheries and Aquaculture, 1st Focal Point /CAR/LCBC)
- DOKO Paul (Head of mission for Agriculture, 2nd Focal Point/CAR/LCBC)
- MABESSIMO Landry Cléoface (National Biodiversity Coordinator)
- MATAMALE Jean Jacques Urbain (Coordinator NGO CIEED)
- YAKETE Marien (NGO Forêts et Développement Durable/Forest and Sustainable Development)
- ZANRE Kevine (Coordinator NGO Forêts et Développement Durable/Forest and Sustainable Development)
- DJIMASSE Thomas Okidjin (Director General of the Civil Protection)
- NDOUSSOU Maurice (Director of Risk and Disaster Prevention)
- TOMBET Jules (Ramsar Focal Point)
- Ms Johanna Korhonen (WMO Secretariat)

- Ms Alice Soares (Lead Consultant, WMO)



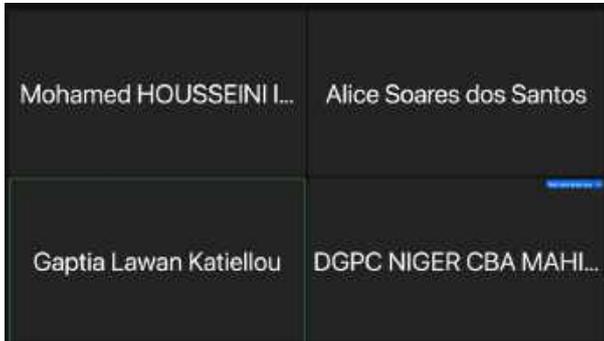
Chad (meetings on December 14, 2022 with NMHSs and on January 13, 2023 with the Civil Protection):

- Mr Toussaint Naradoum (National Hydrological Service)
- Mr Djergo Gaya (National Meteorological Service)
- Mr Singambaye Djekounda (National Meteorological Service)
- Mr Djasrabe Nguemadjita (Ministry of Water Resources)
- Mr Jogramel Jeremie Alainaye (Ministry of Water Resources)
- Ms Johanna Korhonen (WMO Secretariat)
- Ms Alice Soares (Lead Consultant, WMO)
- Mr Daniel Sighomnou (Consultant, WMO)



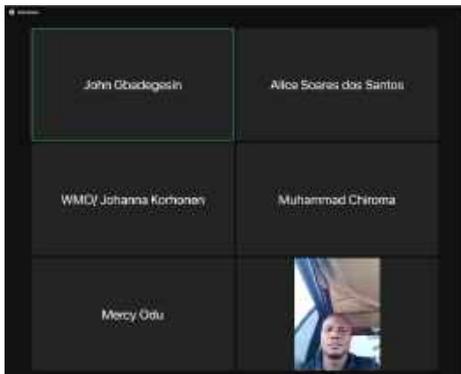
Niger (meeting on December 16, 2022):

- Mr Mohammed Housseini (National Hydrological Service)
- Mr Gaptia Lawan Katiellou (National Meteorological Service)
- Mr Mahirou (Civil Protection)
- Ms Johanna Korhonen (WMO Secretariat)
- Ms Alice Soares (Lead Consultant, WMO)



Nigeria (meeting on December 6, 2022):

- Ms Mercy Odu (Ministry of Water Resources and LCBC Focal Point)
- Mr Momoh Abedoh Salihu (Hydromet Division in the National Meteorological Service)
- Mr Mr John Gbadegesin (National Hydrological Service)
- Mr Muhammad Chiroma (Representing an NGO based in the Lake Chad Basin)
- Ms Johanna Korhonen (WMO Secretariat)
- Ms Alice Soares (Lead Consultant, WMO)
- Mr Daniel Sighomnou (Consultant, WMO)
- Ms Babette Koulchoumi (Gender Consultant, WMO)
- Mr Ayouba Moussa (Environment and Social Consultant, WMO)



A2.3 Summary of the technical discussions and inputs received

The summary of the technical discussions and inputs received is presented in **Table A2.3.1**, and organized in the following main areas: (1) Meteorological network in the Lake Chad Basin; (2) Hydrological network in the Lake Chad Basin; (3) Personnel working in the technical institutions; (4) Security issues; (5) Databases; (6) Telecommunications; (7) Products and bulletins; (8) Early Warning System (EWS); (9) Legislation; (10) Ongoing projects; and (11) Sustainability.

Table A2.3.1. Summary of the technical discussions per main area.

Main area	Cameroon	CAR	Chad	Niger	Nigeria
Meteorological network in the Lake Chad Basin	<ul style="list-style-type: none"> - 6 functioning meteorological stations; precipitation is the main parameter collected - There are stations that have been acquired by LCBC, and training has been provided, however financial resources are needed for their installation. These stations are stored at the National Meteorological Service - Data collection is done with ObsData; supplier should be contacted to centralize all data through the same acquisition system - Climate of the region is not taken into consideration when the selection of the equipment is done, and therefore equipment operates for a short period and then damages 	<ul style="list-style-type: none"> - No functional meteorological stations - There are stations that have been acquired by LCBC, and training has been provided, however financial resources are needed for their installation. These stations are stored at the National Meteorological Service - ASECNA has 3 stations but outside the Basin. Data from these stations is shared regularly with the National Meteorological Service, but not with the Sector Services. These Sector Services may have access to the data in case of studies based on a request. 	<ul style="list-style-type: none"> - 15 synoptic stations; 20 agromet stations 10 climatological stations; more than 200 rain gauges, but less than 100 are working - UNDP project acquired 60 AWSs, of which 40 are installed and 20 have problems with the batteries - Problems with payment of the transmission costs after the project ends - Government allows selling data but this does not work well - There is a need for vehicles to support maintenance of the stations 	<ul style="list-style-type: none"> - 15 synoptic stations; 10 climatological stations - There is a project financed by the Government to modernize the National Meteorological Service, which includes more than 100 Automatic Weather Stations (AWSs) and agrometeorological stations; of which 75 have just been installed and there is lack of security to install the remaining stations - Need spare parts - Need to rehabilitate the manual stations 	<ul style="list-style-type: none"> - 8 functioning weather stations + 1 station where there are security problems - There is a need for 12 more stations
Hydrological network in the Lake Chad Basin	<ul style="list-style-type: none"> - Network (hydrometric and groundwater stations) established in 1990 - There is a plan to rehabilitate the stations and to install new stations; there is a plan for 30 groundwater stations - There are 10 hydrometric stations and 5 groundwater stations that have been acquired by LCBC, and training has been provided; additional groundwater stations have been acquired but still to be installed 	<ul style="list-style-type: none"> - No functional hydrological stations 	<ul style="list-style-type: none"> - 50 hydrometric stations (the whole country) but some are not functioning - AGRYMET – 6 automatic stations - 15 automatic stations, but data stays at the datalogger + 5 semi-automatic (all need to change batteries) - There are 10 hydrometric stations that have been acquired by LCBC, and training has been provided; additional groundwater stations have been acquired but still to be installed - There are missing hydrological data - There is a need for vehicles to support maintenance of the stations 	<ul style="list-style-type: none"> - Many stations but only 10 that work; of which 5 are automatic but only 1 works - Network needs to be modernized/upgraded 	<ul style="list-style-type: none"> - 103 hydrological stations across the country (manual and telemetric) – some also used by the related Basin Commissions - There are rating curves for these locations - Need to upgrade these stations and acquire additional 20 - Government provides counterpart funds to support operation and maintenance - The NGO is responsible for maintenance of 14 stations with Trust Funds; but with vandalism and floods, these are not operating and need to be rehabilitated
Personnel working in the technical institutions	<ul style="list-style-type: none"> - There are sufficient personnel to operate the meteorological stations - However, training is required on operation and maintenance, as well as calibration of the stations; similar for the database operation - Capacity building is required for the production of bulletins - No gender balance 	<ul style="list-style-type: none"> - No hydrological specialists in the country (education and training needed) - Lack of meteorological technicians - some are retiring and there is no replacement - Training is needed in all areas: equipment (including installation, operation and maintenance), operations and climatology 	<ul style="list-style-type: none"> - Need training on database management, operation and maintenance, data-processing - There is a lack of staff (youth) to work on NWP and forecasting - There are no hydrological models; with the new WB project to address floods in N'Djamena, it is expected to implement hydrological models 	<ul style="list-style-type: none"> - There are sufficient personnel to operate the meteorological stations; but don't get an appropriate position - Personnel is retiring, so there is a need to train more technicians - Observers are demotivated due to lack of payments - Personnel working on hydrological modelling have 	<ul style="list-style-type: none"> - There are personnel to operate the stations, but still not sufficient as some staff retired and there is no recruitment; there is a need for a plan for succession - Lack of hydrologists - There are 45 community river watches to look after the stations (under the NGO)

		<ul style="list-style-type: none"> - Training should be provided to technicians, but also to local authorities, as they could be involved in the operation and maintenance of the new stations and also in the dissemination of warnings under the EWS. We should take the opportunity of the establishment of these local government structures. - There are about 30% women in the National Meteorological Service, including the head of the climatology department - No gender balance 	<ul style="list-style-type: none"> - There is a lack of human resources to work on hydrological modelling; there are people with a degree that is not recruited - On meteorology, staff has been trained in ACMAD and Meteo Morocco (supported by CREWS) - There is a need to recruit people that had already been trained and have a degree - There is a need to re-train the volunteers that are supporting the operation and maintenance of the stations - No gender balance 	<ul style="list-style-type: none"> been trained by an Italian company - Personnel need to be trained in NWP and forecasting (meteo) - No gender balance 	<ul style="list-style-type: none"> - Need training on database management, operation and maintenance, data-processing, flood modelling - Need to strengthen the capacity on ICT - No gender balance
Security issues	<ul style="list-style-type: none"> - There are security issues and vandalism of the stations 	<ul style="list-style-type: none"> - There are security issues and therefore the involvement of local government, NGOs and communities is needed to avoid vandalism of the stations - There is the presence of military forces, but this is not sufficient 	<ul style="list-style-type: none"> - There are security issues and vandalism of the stations 	<ul style="list-style-type: none"> - There are security issues and vandalism of the stations 	<ul style="list-style-type: none"> - There are security issues and vandalism of 1 station
Databases	<ul style="list-style-type: none"> - CliDATA (meteo); previously it was ClimSoft - Capacity building required - There is a data-processing software for hydrological data at the local level, but there is no consolidation of data at the national level in real time 	<ul style="list-style-type: none"> - There is a database at ASECNA, which shares data with the National Meteorological Service - However, the data in the database does not cover the Lake Chad basin area - There is no database at the National Meteorological Service - There are historical data up to 1995, which are stored in France 	<ul style="list-style-type: none"> - With aid of AGRYMET, there is a database and server (both meteo and hydro), but both need to be upgraded; need antivirus - Data rescue of meteo data done with the support of CREWS 	<ul style="list-style-type: none"> - CliDATA (meteo) - There is a significant lack of hydrological data, of infrastructure to collect and processing the data - Data rescue required for the meteo data; some data are in Excel - Hydromet.V2 database is used (hydro) 	<ul style="list-style-type: none"> - Hydromet.V2 (hydro database) – need to be upgraded - No meteo database
Telecommunications	<ul style="list-style-type: none"> - Services lack stable internet; it requires an optical cable - Mobile operator should be used for the transmission of data via GPRS; however, there is no interoperability of systems 	<ul style="list-style-type: none"> - Internet and mobile providers: Orange and Telecel - The Lake Chad basin is covered by satellite, telephone and radio communications - However, Services lack stable internet 	<ul style="list-style-type: none"> - Data is coming automatically to the server; with the support of CREWS, data will go directly to WIS (Morocco) - Internet connection in place with the support of UNDP, but will end soon 	<ul style="list-style-type: none"> - Services lack stable internet 	<ul style="list-style-type: none"> - Services lack stable internet
Products and bulletins	<ul style="list-style-type: none"> - PUMA station is not operational, so staff use satellite imagery from Eumetsat available on its website - Forecasters use numerical weather prediction products made freely available from global and regional centres such ECMWF, UKMO, NOAA African Desk, and ACMAD 	<ul style="list-style-type: none"> - There is a daily weather bulletin - There is an annual weather bulletin - There is no seasonal forecast bulletin - There are no hydrological bulletins - The National Meteorological Service has access to ASECNA's 	<ul style="list-style-type: none"> - There is a stakeholders working group that meets every 10 days from May to October - There is a daily weather bulletin - There is a decadal weather bulletin - There is a seasonal forecast bulletin (meteo + hydro) - Use NWP products from global and regional centres 	<ul style="list-style-type: none"> - The National Meteorological Service runs WRF model without data assimilation, with the support of Meteo-Toscane - There is a daily weather bulletin issued twice a day - There is a decadal weather bulletin - There is a monthly weather bulletin 	<ul style="list-style-type: none"> - There is a daily weather bulletin - There is an agromet forecast /crop calendar - There is a seasonal forecast bulletin - There is an annual flood outlook throughout the year based on climate predictions - There is a monthly flood and drought bulletin

	<ul style="list-style-type: none"> - There is a daily weather bulletin issued twice a day - There is a decadal weather bulletin - There is a monthly weather bulletin - There is a seasonal forecast bulletin (3 months) - There is a flood bulletin - There is a drought bulletin 	<p>numerical weather prediction products and satellite imagery</p> <ul style="list-style-type: none"> - There are no hydrological models 		<ul style="list-style-type: none"> - Hydrological model for flood forecasting (http://www.slapis-niger.org/) - GLOFAS (https://www.globalfloods.eu) - Flash Flood Guidance System for West Africa, implemented with the support of WMO via CREWS 	<ul style="list-style-type: none"> - There are flood vulnerability maps that highlight hotspots - Geospatial stream flow model, Soil Water Assessment Tools - Use COSMO model (staff get trained at DWD) - HydroSOS has been initiated
EWS	<ul style="list-style-type: none"> - Population needs to be sensitized - Roles and responsibilities are not well established; there is a leadership problem - No EWS well defined; some elements in place 	<ul style="list-style-type: none"> - CAR uses flood hazard, exposure and vulnerability information to carry-out on an ad hoc basis risk assessments. This work was done during the flood on the Oubangui in Bangui and the Lobaye in M'Bata, the two stations in operation at the moment. - National Strategy for Disaster Risk Management – this strategy sets out an action plan to implement EWS until 2030 - 2 laws that establish administrative sites and territorial committees – these local government structures must be involved in EWS - There is the national REDD+ strategy (https://fokabs.com/wp-content/uploads/2021/07/SN-REDD-de-la-RCA_21-Juillet-2021_propre.pdf - it also includes actions related to EWS - with the Ministry of Environment - ORSEC plan which describes the tools and resources available in case of disaster - There are no contingency & response plans, but this is foreseen in the strategy and action plan - There is humanitarian response and partnership with NGOs 	<ul style="list-style-type: none"> - With the support of CREWS, the warnings are now disseminated on the communitarian radio - There is a need for staff dedicated to present the weather forecasts and warnings - Disaster risk management is more on paper than in practice - There is a contingency plan for food security; - There are 4 pilot sites for the development of contingency plans - There is a national plan (for floods and droughts) and a plan specific for the Lake Chad Basin (specific for floods) - ONGs are critical partners on the ground - There is a need for sensibilization campaigns - CREWS is supporting the uptake by the Civil Protection Office of the hydromet products, as staff does not know what to do based on the hydromet information - There is a lack of human and financial resources, as well as tools 	<ul style="list-style-type: none"> - The National Meteorological Service must be part of the multi-hazard EWS centre/committee - There is an emergency plan - Ministry of Interior is responsible for the EWS centre/committee - Warnings are disseminated by community radio, TV (governmental and private), mobile phones/SMS - There is a Plan ORSEC - Need centres at the regional level and capacity building; well structured at the national level 	<ul style="list-style-type: none"> - There are 45 community river watches to disseminate the warnings (under the NGO) normally by calling; these are volunteers - No formal contingency plans but communities have their own, as they know the locations that are more vulnerable - Since 2019, there is an annual budget from the government to support the dissemination of warnings via SMS
Legislation	<ul style="list-style-type: none"> - Government agency 	<ul style="list-style-type: none"> - Decree N° 18.130 of 02/06/2018 on the organization and functioning of the Ministry of Transport and Civil Aviation, including the National Meteorological and Hydrological Department 	<ul style="list-style-type: none"> - For meteorology, there are 3 legal documents: Law 035, the Decree 521 (establishes the National Meteorological Service as an Agency responsible for the meteorology and climate change) and a regulation that 	<ul style="list-style-type: none"> - Decree assigning the Directorate of Hydrology, the General Directorate of Water Resources and the Ministry of Hydraulics and Sanitation 	<ul style="list-style-type: none"> - Government agency with commercial services

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		<p>- There is the National Adaptation Plan with the roadmap and national action plan for the implementation of the NDC - the CAR Government has been technically and financially supported by UNDP through its Climate Promise initiative https://www.undp.org/fr/central-african-republic/actualites/lutte-contre-le-changement-climatique-rca-la-feuille-de-route-et-le-plan-daction-national-de-la-mise-en-oeuvre-de) - ongoing project with the Ministry of Environment</p>	<p>defines the commercialization of data - For hydrology, there is a Law that establishes the Water Resources Department; hydrological data are public</p>		
Ongoing projects	<p>- There is a plan for a WB project - Project PULCI</p>	<p>- Phase 2 of the Climate Promise Initiative https://www.undp.org/fr/central-african-republic/news/initiative-climate-promise-une-phase-ii-lanc%C3%A9e-en-rca) - funded by UNDP - The World Bank with FAO are implementing a project to combat food and nutrition insecurity https://www.worldbank.org/en/news/press-release/2021/06/29/republique-centrafricaine-la-banque-mondiale-renforce-la-lutte-contre-insecurite-alimentaire-et-nutritionnelle) - This project also includes EWS aspects</p>	<p>- CREWS – Chad https://www.crews-initiative.org/en/projects/chad-support-strengthening-of-national-capacity-deliver-climate-hydrometeorological-and - Regional projects that include Chad - Building Resilience through Innovation, Communication, and Knowledge Services (BRICKS), Climate Resilient Agriculture and Productivity Enhancement (PRAPS). - Other development partners are involved in various projects including AFD (Flood Prevention), IFAD (Project to improve the Resilience of Agricultural Systems), EU (MESA, ECOAGRIS), AfDB (Food Security – P2RS), and the Government of Chad (OPEN). - Potential pipeline investment, the WBG is in discussions with the Government of Chad for a climate resilience investment focusing on hydromet and early warning systems modernization. Action Plan for Climate Adaptation and Resilience. - "Projet de gestion des eaux pluviales et de résilience</p>	<p>- CREWS-West Africa https://www.crews-initiative.org/en/projects/west-africa-region-seamless-operational-forecast-systems-and-technical-assistance-capacity</p>	<p>- No information provided</p>

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			urbaine”, World Bank (https://www.food-security.net/projet/projet-de-gestion-des-eaux-pluviales-et-de-resilience-urbaine/).		
Sustainability	<ul style="list-style-type: none"> - Need to engage other institutions at national level - Need to include spare parts and the transmission costs in the bidding documents - Government needs to take ownership of the projects; and O&M costs need to be explained to the Government since early stages of the project proposal process - A cost-benefit analysis will help defining the priorities for the government investments - There should be a mechanism associated with LCBC to help sustainability 	<ul style="list-style-type: none"> - Need to engage other institutions at national level - Need to include spare parts and the transmission costs in the bidding documents - Government needs to take ownership of the projects; and O&M costs need to be explained to the Government since early stages of the project proposal process 	<ul style="list-style-type: none"> - Chad is listed as part of the first batch countries approved to get Systematic Observations Financing Facility (SOFF) support (https://alliancehydromet.org/wp-content/uploads/2022/11/Decision-item-3.4-Adoption-of-first-batch-of-SOFF-programming-countries.pdf) – only applies for meteo stations 	<ul style="list-style-type: none"> - Need to engage other institutions at national level - Need to include spare parts and the transmission costs in the bidding documents 	<ul style="list-style-type: none"> - There is a need to engage communities

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ANNEX 3 – ENVIRONMENT SOCIAL IMPACT ASSESSMENT (ESIA) AND ENVIRONMENT AND SOCIAL RISK MANAGEMENT PLAN (ESRMP)

The Environment and Social Policy (ESP) of the Adaptation Fund (AF) requires that all projects be screened against 15 principles. This includes the identification of risks in all the component activities with possible mitigation measures to ensure that the projects supported by the AF promote positive environment and social benefits and mitigate or avoid adverse environmental and social risks and impacts.

This Annex therefore presents a detailed environment and social impact assessment (A3.1), which includes the literature review and the results of the consultative process with stakeholders in the field for the risk identification and categorization. Based on these results, an environment and social risk management plan (ESRMP) with mitigation measures, a grievance mechanism, and monitoring and evaluation program have been developed (A3.2).

A3.1 ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA)

Project overview and justification

Rationale for the Project

The Lake Chad Basin is one of the most vulnerable regions to climate change impacts due to its high exposure to hydromet hazards, accompanied by low adaptive capacity within Lake Chad communities, mainly due to high rates of poverty, financial and technological constraints, and an economy heavily reliant on climate dependent natural resources (such as agriculture and fisheries). Even though national level actions are being taken to decrease the negative effect of extreme hydromet events (such as floods and droughts), additional efforts and regional collaboration at the transboundary scale are needed to build climate-resilient communities through more integrated water resources management and climate adaptation measures, improved policies and practices, and an inclusive and participatory approach for end-to-end early warning systems. This will also promote peace among neighboring states and communities in the in the Lake Chad Basin, who share the same climate and face the same climate-related challenges.

As highlighted in the [Early Warning for All \(EW4ALL, the UN Global Warning Initiative for the Implementation of Climate Adaptation\)](#) Action Plan for Pillar 2 (Observations and Forecasting) ([WMO, 2023](#)), quality hydromet observations and forecasts are the fuel that feeds the Early Warning Systems and efforts need to be done by all concerned to improve countries capacity in monitoring and forecasting. At the same time, as highlighted in the [EW4ALL Action Plan for Pillar 3](#), it is critical to also support activities towards enhanced preparedness and response capability to act upon warning and risk information to minimize impact of hydromet disasters on lives, livelihoods and socio-economic systems. Enhancing the enabling environment and building up adaptation capacity of communities are important to ensure resilience to climate risks over the medium to long term, especially within the most relevant climate-dependent sectors in the Lake Chad Basin, namely the agricultural and natural resource sectors as well as disaster risk management. The proposed project intends to strengthen these capacities at the national level in the five countries of the Lake Chad Basin, and at the regional level as weather, water and climate know no borders and a regional dimension to hydromet services and early warning systems would provide a forum and infrastructure for sharing data, expertise, and experiences among stakeholders, leading to optimized costs-benefits.

Project objectives and components

The main objective of the project is to increase the resilience of the population in the Lake Chad Basin by enhancing the countries capability to manage and adapt to climate-related risks through improvement of hydrological monitoring, data systems and service delivery and awareness on climate-related hazards. The impacts of these hazardous events are already being experienced in the region, but its effects will increasingly impact infrastructure, health, water security, life and livelihoods of the population, as well as the integrity of the Basin's ecosystems. The proposed project has therefore been designed to address risk management and adaptation, through six components, as follows:

- Component 1.** Improvement of hydrological and meteorological observing system networks
- Component 2.** Strengthening regional hydrometeorological information systems (database and data sharing mechanism)
- Component 3.** Identification and development of hydrometeorological products and services
- Component 4.** Training of project stakeholders and knowledge development

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Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services (communication and timely diffusion of appropriate product and services to end users)

Component 6. Plans and communities' response capacity

The detailed description of the project's outcomes, outputs and activities is presented in Part II, section A of the project proposal. The detailed assessment and potential mitigation measures are presented below.

Environment and social impact assessment methodology

The screening process serves to identify potential environmental and social impacts and risks, taking into consideration the Adaptation Fund's environmental and social principles. The Environmental and Social Impact Assessment (ESIA) is an instrument to identify and assess the potential environmental and social impacts of a proposed project, evaluate alternatives, and design appropriate mitigation, management, and monitoring measures. This assessment provided the basis for the development of the environment and social risk management plan (ESRMP) presented in A3.2 below. For the preparation of the ESIA, the following methodology was applied:

- Literature review – a review of the literature about the project and its sector of activity was conducted before the field visits to the five countries concerned. The literature review focused on: (i) review of relevant documents of the project to get the understanding of the project activities and its scope; (ii) review the relevant national legislation relating to environmental and social issues and the Environmental and Social Policy of the Adaptation Fund that the project must conform with; and (iii) review of other relevant documents related to the project preparation. Information gathered at this stage was used to conduct the consultation process. The project concept note presented the geographical and hydroclimatic context of the project intervention area and gave a good idea of the natural resources exploited by populations. The regional approach of the project makes it possible to gather a pool of resources and helps prevent conflicts between different users.
- Field missions and stakeholder consultation – the purpose of the field consultation was: (i) to understand and characterize potential environmental, social and economic impacts of the project; (ii) to generate a good understanding of the project by all stakeholders; (iii) to understand people's expectations about the project; and (iv) to enable stakeholders involved in the project to provide their views and recommendations. In addition, site-specific investigations were also conducted to gain insight into likely social and environmental impacts of the project.

The ESIA involved meetings and exchanges with several stakeholders including: LCBC Focal Points; representatives from the ministries of water resources, environment, meteorology, managers of projects operating in the Basin; Research Institutes in the Basin (Universities of Maroua and Diffa); Civil Society Organization in the Basin (ACEEN in Maroua, Cameroun, ONG Karkara in Niger, OHD and several other Basin development partners. Field visits to communities dependent on water resources and prone to climate variability and change events were also conducted. A summary of the consultations is presented below.

Consultative process and results

Consultation is the process of gathering information or advice from stakeholders and taking their views into account when making project decisions and/or setting targets and defining strategies. From December 12, 2022 to February 3, 2023, two consultants hired by WMO have conducted stakeholder consultations with government entities, universities, projects, communities, development partners and NGOs, to understand their existing challenges and needs, collect their opinions and comments on the project, as well as suggestions and recommendations that could improve the environmental and social performance of the project.

Project activities have been designed and will be implemented to minimize any risks for negative social and environmental impacts. Activities were discussed with beneficiaries (including the most vulnerable groups – and taking into account the different needs and constraints of these groups). An extensive consultation process on environmental and social issues was carried out in Bol (Chad), Méri and Kousseri (Cameroon), Bossangoa (Central African Republic), Diffa (Niger) and Hadejia (Nigeria). These are not necessarily the exact sites to be used in the proposed project piloting implementation, as the criteria will be further refined at the inception of the project. Selection of the sites to be visited was based on: (i) representativeness of the problems related to the project (e.g. floods, drought, etc.) that exist in the 5 countries; (ii) security; (iii) accessibility, as some parts of the basin countries were flooded during the period of the year of the visits, and not reachable; (iv) ongoing activities of some elements of EWS in communities; and (v) technical considerations related to the installation of the hydromet stations and existence of stations in the villages. These visits allowed broad consultations with the local populations, the technical services, the administrative and traditional authorities. In summary, during the field consultation process, 192 people were met,

of which 46% are women (**Table A3.1.1**). List of stakeholders consulted, and field mission pictures are provided at the end of this Annex.

Table A3.1.1. Consultation statistics.

Country	Number of Men	Number of Women	Percentage (%) of Women	Number of persons (<35 years)	Number of persons (36-50 years)	Number of persons (>51 years)	Total
Cameroon	19	18	48.7	14	16	7	37
Chad	12	14	53.9	9	12	5	26
CAR	14	13	48.2	3	9	15	27
Niger	31	35	53.0	9	41	16	66
Nigeria	28	8	28.6	3	23	10	36
Total	104	88	45.8	38	101	53	192

All communities reported that climate change is a reality that disrupts their daily lives. Nowadays, floods are more frequent and can cause significant damage, production cycles are disrupted, and warming is becoming more evident. The populations reported that they are witnesses of a changing world because the traditional knowledge that allowed them to make predictions of climatic events (rains, floods, locust attacks) is less reliable today. They must therefore adopt new hydrometeorological observation tools.

Conflicts between the different water users are accentuated because of the floods. There are many conflicts among farmers-farmers, fishermen-fishermen, herders-herders, and farmer-herders. Most of the conflicts take place in the islands. On the other hand, the drying of the lake favors the rise of salt, thus the pH decreases, and the lands become less productive.

There was an active participation and a good understanding of the social, environmental and gender issues of the proposed project by the various actors. The stakeholders met congratulate the advent of the project and recognize that its objectives adequately meet the needs of the populations confronted with the effects of climate change. Technical Services in general complain about their working conditions and the lack of resources they need to carry out their tasks. They pointed out the lack of human resources and financial support: mainly technicians in order to handle the implementation of automatic stations. They also face a lack of energy supply and internet connection in some cases. In some countries the hydrometeorological observation equipment acquired with other projects is located in offices for lack of storage facilities. The Technical Services also highlighted the vandalism of technical equipment, in particular the limnometric scales. To remedy this problem, major awareness campaigns will be necessary in the villages and with customary and administrative authorities. Another concern reported is about gender issues in their structure. Women are generally underrepresented in general in the Technical Services due to several factors, including schooling, professional training, and family situation. They recommended that the project must encourage women to be sensitized, trained and motivated by good and high position in the staff of meteorology and hydrology for the emulation of other young girls and boys.

Stakeholders recommended that the project must develop collaborative relationships with other projects (e.g. PROLAC, PDRI-CL, RESILAC) operating in the Basin, development companies (such as SODELAC in Chad, Regional Development Council in Diffa), NGOs and associations (such as *Sauvons le Lac Tchad*, Karkara, OHD, Cadelac, Copac, Redco, ACENN, Balawa) in order to avoid duplication and use the available resources more effectively to respond to the concerns of the populations.

The heads of the universities met in Maroua (Cameroon) and Diffa (Niger) expressed their willingness to work closely with the project. They have the human resources (teachers, researchers and students) capable of carrying out research and development projects in line with the objectives of the project, including integrated water resources management and early warning systems.

Stakeholders have stressed that the security situation in the Basin has been very difficult for years with attacks on villages, kidnappings etc. For the past three years, the security situation has begun to improve in some parts of the Basin (Cameroon and Central African Republic) and there are returns of displaced populations to their villages of origin. In some parts of Niger and Chad, there is still a strong presence of defense and security forces.

In general, the public consultations took place in a friendly environment. Active participation and a good understanding of the social and environmental issues of the project were noted. The elements of analysis of the exchanges resulting from the public consultations show a good level of acceptability of the project by the Technical Services, the local authorities, the population and the NGOs working in the context of climate change. All stakeholders consulted support the project and consider it relevant, as well as the planned

activities. They highlighted that the project would promote hope for greater revitalization of development activities in the Lake Chad Basin. The project was well received, and stakeholders are convinced that it will provide solutions for better integrated water resources management. The main problems encountered are the silting up of waterways, flooding, deforestation, the presence of invasive plants (typha). They expressed that the project could help through detailed studies to better understand the causes of floods and propose appropriate solutions that will contribute to strengthening the resilience of local communities.

In summary, the stakeholders consulted expressed their strong desire to see the project started and especially to be involved in the implementation phase, as they were consulted during the preparation. They are very favorable to the project and show their full support for its realization. However, they expressed concerns and addressed recommendations while strongly wishing that these be taken into account in the planning and execution of project activities. These include: the involvement of stakeholders throughout the project cycle, the integration of gender and the consideration of vulnerable groups, the strengthening of collaboration with other projects, development companies intervening in the basin. Also, universities and research institutions should participate as much as possible in project activities. Finally, climate change is a long-term process, which is why stakeholders want the project to support them over time.

Applicable domestic and international laws for environment and social management

Environmental policy documents are general instruments with which States equip themselves for the management of their environment. National environmental policies are major instruments of public policies for the State in that they establish, in the medium or long term, the vision of the State, the general framework of all the interventions of the State and other actors in this sector.

National environmental policies define in particular: (i) the objectives pursued by the State in terms of the environment; (ii) the guiding principles that should guide the actors in the field of Environmental Protection; (iii) the role of each category of actors; (iv) the means to achieve these objectives (legal, financial, institutional, operational); and (v) the systems for monitoring and evaluating the implementation of the said policy.

National legal environmental protection

Several laws, policies, instruments and administrative frameworks are available to support sustainable environmental and social management. The ESIA aims to identify the range of obligatory environmental and social management measures including sectoral guidelines to be undertaken and followed, respectively during the planning, design, implementation and operation phases of the project and so as to ensure compliance with the AF principles as well as environmental and social compliance requirements of participating countries. For this purpose, a number of legal, regulatory and administrative frameworks are essential to guide policy considerations and decision making in implementation of the program. Thus, the framework laws on the Environment and water which constitute major instruments for implementing environmental national policies in that they set out a minimum legal framework for the protection of all the constituent elements of the environment exist in the 5 participating countries (**Table A.3.1.2**).

Table A.3.1.2. Framework environmental and water laws of participating countries.

Country	Framework law on the environment	Water Resources Law
Cameroon	Law No. 96-12 of August 5, 1996 on the framework law relating to the Environmental management in Cameroon	Law No. 98-005 of April 14, 1998 on the water regime
Chad	Law No. 14/PR/98 defining the general principles of Environmental protection in Chad	Law No. 16/PR/99 of August 18, 1999 on the Water Code, amended and completed by Ordinance n° 018/PR/2011 ⁴
Central Africa	Law No. 07.018 of December 28, 2007 on the Code of the Environment of the Central African Republic	Law No. 06.001 of April 12, 2006 on the Water Code of the Central African Republic
Niger	Law No. 98-056 of December 29, 1998 on the framework law relating to Environmental management in Niger	Ordinance no. 2010-09 of April 1, 2010 on the Code of water in Niger
Nigeria	National Policy on the Environment, 2016.	Water Resources Decrees, 101 of August 28, 1993

The procedures applicable for assessing project's environmental and social impacts differ between the countries. However, in all the participating countries, in accordance with the national laws on environmental assessment full-fledged ESIA's are only required for projects with high or substantial risks. The other projects only require to manage potential environmental and social impacts through mitigation measures.

⁴ <http://humanright2water.org/wp-content/uploads/2022/12/HR2W-and-HRHE-Mapping-for-Chad-COLORS.pdf>

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This proposed project is an environmentally positive project with no potentially adverse impacts, and it is aligned with the Adaptation Fund's Environmental and Social Policy and Principles, the countries environmental and social laws and regulations and the international conventions and standards.

The potential impacts of project activities mainly relate to land acquisitions and the production of waste from the use of batteries at hydromet stations. The legislative and regulatory texts relating to these impacts will be analyzed in this section. The main national texts relating to land acquisition and waste management are presented in the **Table A.3.1.3**.

Table A.3.1.3. Legislative and regulatory texts related to land acquisition and waste management.

Country	Land acquisition	Waste management
Cameroon	Ordinance No. 74-1 of July 6, 1974 establishing the land tenure system and determining the allocation framework lands; Decree No. 2003/418/PM of February 25, 2003 fixing the rates of compensation to be allocated to the owner victim of destruction for public utility of cultivated crops and trees.	Law No. 96/12 of August 05, 1996 on the framework law relating to environmental management.
Chad	Law No. 25 of July 23, 1967 on the limitations of land rights highlights the need for development and the essentially agricultural acceptance of any land development. Law n°23 of July 22, 1967 and its implementing decree n°187 of August 1, 1967.	Law n°014/PR/98 of August 17, 1998 defining the general principles of Environmental Protection.
Central Africa	Ordinance No. 71/022 of 17-03-71 supplementing the provisions of Ordinance No. 71/015 of February 11, 1971, relating to the procedure for allocating state land and modifying the composition of the state advisory committee. Law No. 96.018 of May 4, 1996, establishing a general procedure involuntary resettlement.	Law No. 07.018 of December 28, 2007 on the environmental code.
Niger	Law No. 61-37 of November 24, 1961, regulating expropriation for public utility and temporary occupation amended and supplemented by Law 2008-037 of July 10, 2008 relating to the involuntary displacement and resettlement of populations (Article 3). Ordinance No. 99-50 of November 22, 1999 setting the rates for the alienation and occupation of State-owned land (article 1) fixing the basic prices for the alienation of land.	Law No. 98-56 of December 29, 1998 on the framework law relating to environmental management. Waste management includes the collection, transport, storage, sorting and treatment operations necessary for the recovery of reusable elements and materials as well as the deposit or discharge into the natural environment of all other products under conditions specific to avoiding nuisance (art 62).
Nigeria	Nigeria Land use decree of 1978, chapter 202; The State holds property rights in land, individuals are granted usufructuary rights and the introduction of an administrative system for land allocations instead of relying on market forces. Land use act provides equal land acquisition, however customary law, sharia law, and traditional gender norms prevail in land resources management.	National Environmental Protection (Management of Solid and Hazardous Wastes) Regulations, 1991; regulates the collections, treatment and disposal of solid and hazardous wastes from municipal and industrial sources.

International legal framework for environmental protection

International environmental conventions are important for the implementation of Vision 2025 and the Lake Chad Basin Water Charter. They contain major principles and rules for the protection of the environment and organize interstate cooperation in the field of the environment. They constitute the framework within which technical and financial assistance is provided to developing States to ensure the protection of the environment. They are therefore major instruments for implementing the LCBC Vision 2025 and the Water Charter. All Five States have ratified the three Rio de Janeiro conventions: (i) the United Nations Framework Convention on climate Change (UNFCCC); (ii) the Convention on Biological Diversity (CBD); (iii) the United Nations Convention to Combat Desertification (UNCCD). Lake Chad has been recognized as a Ramsar site in 2001 in its Nigerien and Chadian part and in 2008 in its Nigerian and Cameroonian part. The participating countries also ratified the Bamako Convention on Ban on the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (1991).

LCBC environmental protection legal framework

The current international legal framework of Lake Chad consists of the Convention and statutes relating to the development of the Lake Chad Basin signed in Fort Lamy (N'Djamena) on May 22, 1964. These two conventional instruments were initially adopted in 1964 by four countries (Cameroon, Niger, Nigeria, Chad)

to deal with development problems centered on the lake Chad in an area of 427,000 km², called the “conventional basin”. The conventional basin has been extended as new Member States have joined and now covers an area of nearly 970,000 km², spread over six countries: Cameroon, Libya, Niger, Nigeria, the Central African Republic and Chad.

An Agreement on common regulations on fauna and flora was signed on December 3, 1977 in Enugu by four States (Cameroon, Niger, Nigeria, Chad) for the protection of fauna and flora. Through this convention, the States Parties undertake to protect terrestrial fauna (through the listing of protected species, the fight against trafficking in certain specimens and trophies, the regulation of reptile hunting and the creation of protected areas) and aquatic fauna (through the regulation of fishing methods, the establishment of fishing statistics, the regulation of the export and import of fish as well as the fight against pollution) (art. 1 -11).

The Lake Chad Basin Water Charter is a major instrument for protecting the environment of the basin in that it includes numerous and important provisions on the protection of natural resources. It thus emerges that the objective of the Water Charter is the sustainable development of the Lake Chad Basin, by means of an integrated, equitable and concerted management of the shared water resources and the environment of the Basin (art. 2).

Among the specific objectives relating to the environment, mention should be made of the preservation of ecosystems and their biodiversity as well as the qualitative management of wetlands. These are (i) the determination of the principles and rules relating to the preservation and protection of the aquatic systems of the Basin and their biological diversity, in particular the fight against pollution and the sustainable management of fishing; (ii) establishment of a polluter-pays principle at the basin level; (iii) carrying out environmental assessments and impact studies.

The Water Charter enshrines the most important principles in terms of the environment, whether they are principles of national and/or international application. Mention should be made, among others, of the principles of sustainable development, precaution, prevention, polluter-pays, information and participation (art. 7).

Environment and social state of the Lake Chad Basin

Part I of the project proposal provides a description of the environment and ecosystems of the Lake Chad Basin, as well as its social-economic context. Therefore, this section only focuses on the main issues and challenges.

The Lake Chad Basin, which is characterized by strong demographic growth and high hydromet variability, is emblematic of the challenges posed by climate change in the least developed countries. It is one of the most threatened ecosystems in Africa, combining hydroclimatic variability, ecological ecosystem richness and vulnerability, socio-economic (poverty, production of food resources and employment) and political (governance, security) issues. The prolonged drought situations since the 1970s have contributed to the degradation of its environment. This is due to several factors, in particular the effects of climate change, which have contributed to reducing the lake’s production potential and the vulnerability of a poor rural population dependent on natural resources.

The LCBC has identified seven major cross-border environmental problems in the basin and classified them according to their importance:

- 1) **Hydrological variability and freshwater availability:** it represents the major natural cause of ecosystem degradation of the Lake Chad basin. It is mainly due to the sudden drop in rainfall during the 1970s to 1980s characterized by a long drought. This drought that continued until 2008 particularly affected Lake Chad via the Chari River, which supplies it with between 85% and 90% of its total contributions.
- 2) **Water pollution:** Only limited data is available on water quality in the Basin. The city of Kano (Nigeria) stands out with the rapid proliferation of tanneries and textile industries, sources of potential industrial pollution. In the Chari-Logone basin, the use of fertilizers, herbicides and insecticides for cotton growing and rice is common. This could in the long run cause water pollution problems. On the other hand, bacterial pollution exists on a large scale: between 2010 and 2012, cholera, a recurrent epidemic in the region, has caused many victims in Chad, in the Far North of Cameroon, in Maiduguri in Nigeria and in Lake Chad.
- 3) **Sedimentation of rivers and water bodies:** it is omnipresent in the center of the basin, especially in the Lake Chad region where it is both water- and wind-powered. There is waterborne sedimentation resulting from the erosive action rains on the sub-watersheds, runoff on the flat reliefs and linear erosion which degrades the waterways and banks, due to the action of floods in the rivers. The hydraulics of the Chari-Logone system is reduced during low water periods due to sedimentation.

But floods often appear in residential areas during periods of flooding due to meanders and banks of sand that divert watercourses from their major beds. Sedimentation affects both fishing and transport in the lake and other basin water bodies. Aeolian sedimentation comes from dunes in regions Sahelian and Saharan. It fills the northern part of the Lake Chad, mainly by reducing the extent of open water.

- 4) **Decline in biological diversity:** this is a major concern. However, it seems very difficult to define consistently its current magnitude because of insecurity in the basin which affects almost all protected areas and because of the lack of available data. In 2008, however, some figures from previous studies have shown that biodiversity has considerably degraded, due to anthropogenic actions, damage and modifications to ecosystems which have intensified. For example, deforestation for firewood and for shifting cultivation is a widespread phenomenon in all the countries of the bowl. However, the return of good rainfall in recent years has revived the vegetation cover here and there, particularly in areas of military conflict with the abandonment of land by populations fleeing armed clashes.
- 5) **Invasive plants:** the ecosystems of the basin are affected by invasive plants, especially in regions around Lake Chad. The first one is the cattail (Typha), an invasive plant species found in the wetlands of Hadejia Nguru in Nigeria. They contribute to the decrease in hydrological regime of Komadougou-Yobé, already diminished by the presence of numerous dams upstream of the river. The second is Prosopis africana, a tree species which abounds especially in the region of Diffa (Niger) in a real thick forest. In Lake Chad, Prosopis Africana is a problem for herders, farmers and fisherman. Many other invasive species, very few studied, also exist in the lands and waters of the basin.
- 6) **Population growth:** demography has increased a lot in recent years. It is accompanied by a high unemployment rate, by a high rate of urbanization in large cities, such as Kano, Maiduguri and N'Djamena and by growing insecurity in the region. These demographics factors have increased the pressure on water resources, in terms of uses and sharing, including on the lake.
- 7) **Climate change:** it is frequently invoked to explain the current state of the natural environment in the Lake Chad Basin, including impacts on people working in the agricultural sector, fishing sector, poor people living in high-risk urban areas, migration, etc., as well as the possible disappearance of the Lake. The impacts of climate change affect men and women differently as their roles differ in the society. It has been observed that climate change could increase existing gender inequalities by aggravating the vulnerability and adaptability of women to face climate change impacts. Women suffer the heaviest toll as men often leave villages in times of natural disaster, leaving women and children behind. According to the IPCC report, the Lake Chad Basin is among the regions of the world where projections of precipitation trends come with very high uncertainty and even the direction of trend is unclear. Furthermore, even if no trend on the average can be identified, it is likely that extreme rainfall events as well as severe droughts will be more frequent (IPCC, 2021).

Identification of the main environmental and social risks of the five countries participating in the project

The five countries participating in the project are confronted with numerous social and environmental problems. Certain problems are common to these countries due, on the one hand, to their character as developing countries, confronted with persistent situations of poverty and, on the other hand, to their belonging to common ecosystems. These are mainly the effects of climate change, degradation of biological diversity, water quality, pollution and nuisances. The main environmental and social problems of the countries are presented in the **Table A3.1.4** below.

Table A3.1.4. Main environmental and social issues per country.

Country	Main environmental and social issues
Cameroon	<ul style="list-style-type: none"> ▪ Climate variability with alternating floods and droughts ▪ Soil degradation: this results from the strong pressure on the land by due to the strong demographic growth but also to the use of extensive agricultural techniques ▪ The degradation of biodiversity and especially of forest ecosystems in reason for their overexploitation ▪ The negative environmental impacts of mining in terms of water and soil pollution ▪ The frequency of water-related diseases ▪ The natural and technological risks which constitute threats permanent for the populations and the national economy ▪ The risks associated with poor management of industrial and household waste ▪ Agro-pastoral conflicts around the main natural resources
Chad	<ul style="list-style-type: none"> ▪ Droughts and desertification: they are the cause of land degradation and the impoverishment of plant cover ▪ Land degradation: it is mainly caused by years of drought marked by the irregularity and rarity of the rains, the trampling of the soil by livestock and overgrazing during the rainy season, to which must be added the clearing and bush fires ▪ The degradation of biological diversity resulting from the abusive exploitation of natural resources ▪ Conflicts between farmers and pastoralists due to competition for access to water and rangelands and pastures ▪ Pollution and various nuisances ▪ The silting up of waterways

Central African Republic	<ul style="list-style-type: none"> ▪ The loss of biodiversity following bush fires, deforestation for domestic needs and unsuitable farming techniques ▪ The physical, chemical and biological degradation of soils ▪ The effects of climate change ▪ Water and soil pollution due in particular to diamond mining ▪ The problems of quality and availability of drinking water for the majority of the population ▪ Lack of public hygiene and adequate industrial and household waste management systems ▪ The inadequacy and lack of maintenance of drainage works
Niger	<ul style="list-style-type: none"> ▪ Climate variability and natural disasters such as floods, droughts, locust invasions) ▪ The quality of water, in particular the Niger River, which is the main provider of water resources (agricultural, urban and industrial polluting discharges) ▪ Silting up of basins and watercourses ▪ Desertification, soil and vegetation cover degradation as well as the reduction of soil fertility in a large part of the country during periods of drought ▪ The pressure exerted on natural resources by pastoral activities and the multiplication of agro-pastoral conflicts ▪ The degradation of biological diversity and in particular of forest areas which are subject to particularly strong agro-pastoral pressures or to massive exploitation for wood energy, particularly for cities ▪ Threats to the environment resulting from mining, especially uranium
Nigeria	<ul style="list-style-type: none"> ▪ Threats to biological diversity: these result from the misuse of biodiversity, the underestimation of the benefits of biological conservation, the failure to include all the costs of biodiversity loss in economic accounting ▪ The overexploitation of natural resources: it thus reduces their production potential for the current and future generation ▪ Land degradation: many social and economic activities have negative impacts on soils and it is important to plan the use and integrated management of land to ensure the transition to sustainability ▪ Drought and desertification: they are manifested by deforestation and soil degradation due to the spread of agriculture and commercial logging ▪ Pollution and nuisances: they are linked to many human activities (particularly agricultural, industrial or transport activities) ▪ Threats to the availability of water resources: quantitative (supply shortages) and qualitative (pollution) availability problems leading to soil degradation and risks to human health ▪ The degradation of the mining environment due to the increase in mining, oil and gas activity in the territory ▪ Natural and man-made risks and disasters: natural phenomena are tropical storms, floods, drought, desertification, human diseases, landslides, potential earthquakes and volcanoes ▪ Waste management problems: poor management of industrial or household waste, solid or liquid, leads to the spread of diseases and soil, air and water pollution

Risk identification and categorization

Based on the Guidance document for Implementing Entities on compliance with the Adaptation Fund Environmental and Social Policy, social and environmental risks were identified using the social and environmental risks screening checklist (**Table A.3.1.5**). This table with the evidence-base risk identification has assessed the six project components listed above. This table includes the Checklist of E&S Principles, with related questions and answers that guided the determination of whether distinct types of actions or documentations shows the principle's non-compliance risk. Based on the information and analysis presented in **Table A.3.1.5**, in **Table A.3.1.6** Risks Identification per AF's Environment and Social (E&S) Principles, each AF E&S Principle describes if there is or not a risk associated. Then, all project activities have been screened against the AF E&S Principle in **Table A.3.1.7**.

Table A.3.1.5. Evidence-based Risk Identification.

Evidence-based Risk Identification			
Checklist of E&S Principles	Questions	Yes/No	Evidence-based Identification
1. Compliance with the law	1.1. Has the project identified all the specific, applicable domestic and international laws, regulations, standards, procedures and permits that apply to any of its activities?	Yes	The project activities will be implemented in compliance with relevant laws, regulations and acts of the participating countries. Relevant national and local authorities have been consulted during the consulting process to ensure compliance with all relevant laws, regulations and procedures.
	1.2. Does the Project demonstrate any non-compliance with any applicable national law?	No	There is no non-compliance with any applicable laws of participating countries.
	1.3. Has the project identified activities that may require prior permission (such as planning permission, environmental permits, construction permits, permits for water extraction, emissions, and use or production or storage of harmful substances)	Yes	No large physical or structural construction is foreseen in the development of the activities, and only small works will be required for the new stations. Permissions will be sought as relevant for these stations, including determining the land status of the site and potential need for land acquisition.
	1.4. Has the project identified environmental and social safeguarding requirements, other than those of the AF (e.g. national or of co-financing entities).	No	The project will develop a conflict mitigation and resolution mechanism to receive and facilitate resolution of concerns and grievances of potential project-affected parties arising in connection with the project activities.
2. Access and Equity	2.1. Has the project identified benefits and its geographical area of effect?	Yes	The benefits of the project were discussed with stakeholders during the consultation process. In the different areas of intervention, beneficiaries have been identified and their concerns regarding the planning and implementation of activities have been taken into account.
	2.2. Has the project identified any marginalized or vulnerable groups among potential project beneficiaries?	Yes	Vulnerable groups including farmers, fisherfolk, herders, people with disabilities, women and youth have been identified. These groups took part in all countries in the consultation process.
	2.3. Has the project identified the existing risk to access to the essential services and rights indicated in the principle?	Yes	Marginalized groups, people with disabilities could be excluded or insufficiently benefit from the project's products and services. Measures to improve the inclusion of marginalized and vulnerable groups will be integrated into stakeholder engagement activities.
	2.4. Has the project described the mechanism of allocating and distributing project benefits, and how this process ensures fair and impartial access to benefits?	Yes	Stakeholders are made aware of the risks of excluding vulnerable people and groups from the benefits of the project. The strategy for mobilizing beneficiaries and affected parties will be maintained throughout the planning and implementation of project activities to ensure equitable access of populations to project benefits.
	2.5. Has the project developed stakeholder and local authorities' consultations?	Yes	A broad consultation process was organized from December 2022 to February 2023 with state agencies, local populations in the various participating countries. Consultations with stakeholders were organized in sites of major interest in the various countries (Bol in Chad, Kousséri and Meri in Cameroon, Bossangoa in the Central African Republic, Diffa in Niger and Hadejia in Niger)
	2.6. Has the project presented a mechanism to ensure participation of communities, marginalized, vulnerable groups, stakeholder and local authorities?	Yes	Regular consultations will be organized throughout the implementation of activities with stakeholders and participatory approaches will be adopted. Also, project performance evaluation workshops will be organized with stakeholders, including vulnerable groups.
3. Marginalized and Vulnerable Groups	3.1. In the influence area of the project has there been identified the presence of marginalized or vulnerable groups, including but not limited to children, women and girls, the elderly, indigenous people, tribal groups, displaced people, refugees, people living with disabilities and people living with HIV/AIDS?	Yes	Vulnerable and marginalized groups identified and took part in discussions during the consultations. Their concerns were taken into account in the minutes of the consultations held in the countries participating in the project.
	3.2. Has the project described the characteristics of any marginalized or vulnerable groups, identifying their particular vulnerabilities that would or could make them disproportionately vulnerable to negative	Yes	Marginalized and vulnerable groups have been identified. No particular likely negative environmental or social impacts were identified for these groups. The project is expected on the contrary to contribute to the reduction of

	environmental or social impacts caused by the implementation of the activities of the project?		existing inequalities in EWS for floods and droughts, particularly those affecting marginalized or vulnerable groups. It was pointed out during the public consultations that vulnerable groups (displaced populations, the locomotor handicapped, the blind and children) pay the heaviest price due to the lack of means or the lack of support from other members of the community.
4. Human Rights	4.1. Has the host countries been cited in any Human Rights Council Special Procedures, being on the list of thematic or country mandates?	No	None of the participating countries is cited for human rights violations. On the contrary, countries are victims of transnational terrorism.
	4.2. Is there a risk that rights-holders do not have the capacity to claim their rights?	No	Impacts on rights-holders are limited to potential land acquisition for installation of new stations. Due process will be followed to secure land, respecting the rights of rights-holders. A complaint management mechanism will be put in place in the various project intervention areas. This mechanism will make it possible to receive and process complaints related to the implementation of project activities in a transparent and fair framework.
	4.3. Has the project covered human rights issues during stakeholder consultations during project formulation?	Yes	Human rights issues were discussed during public consultations with stakeholders. Also, the populations were informed of the establishment of mechanisms for managing complaints and violations of rights that would be observed during the implementation of project activities.
	4.4. Has the project included the findings of the consultations on human rights issues in the project document?	Yes	Issues related to human rights were raised during public consultations, but with a view to better protecting populations against violent extremist movements and banditry in certain areas of the basin. Rather, it is an appeal to the State to ensure the protection of populations and their safety. The proposed activities do not or will not violate any of the established human rights. To respond to the general concerns raised, the project will mainstream training on Human Rights into all training activities.
5. Gender Equity and Women's Empowerment	5.1. Has the project identified activities that are known to exclude or hamper a gender group based on legal, regulatory or customary grounds?	No	There are no interventions which will exclude a gender group.
	5.2. Has the project identified elements that maintain or exacerbate gender inequality or the consequences of gender inequality?	Yes	The project will intervene in predominantly patriarchal and Islamized communities with gender inequalities in terms of access to resources, particularly land. There is therefore a risk that women would not benefit equally from the proposed adaptation measures and capacity development interventions. A gender action plan has been developed to remedy inequalities and give the same opportunities to all. Further, the project will develop a gender-responsive stakeholder engagement strategy and mobilize a tool developed by WMO: Training Manual for Gender Mainstreaming in End-to-End Early Warning System for Floods and Integrated Drought Management through a Participatory Design Approach.
	5.3. Has the project identified particular vulnerabilities of men and women that would or could make them disproportionately vulnerable to negative environmental or social impacts caused by the outputs / activities of the project?	No	Potential negative environmental and social impacts caused by project activities are limited and cannot aggravate vulnerabilities.
6. Core Labor Rights	6.1. Has the project determined if the host country has ratified the eight ILO core conventions	Yes	All the participant countries have ratified the 8 International Labor Organization (ILO) conventions (Freedom of Association, Collective Bargaining, Forced Labor, Child Labor, Equality of Opportunity and Treatment, Tripartite Consultation, Labor Administration and Labor Inspection).
	6.2. Has the project reviewed the latest ILO assessments of application of the standards in the country?	No	Not relevant.

	6.3. Has the project identified how the ILO core labor standards are incorporated in the design and the implementation of the outputs / activities' project?	Yes	The project will respect all labor agreements and ensure that its workers are treated fairly, while guaranteeing them safe and healthy working conditions.
	6.4. Has the project describe the common labor arrangements in the sector(s) in which the project will operate, with particular attention to all forms of child labor and forced labor.	Yes	All project interventions will be carried out with respect for workers' rights. Forced labor and child labor will be given special attention by the project.
7. Indigenous Peoples	7.1. Has the project identified if indigenous peoples are present in the area of influence?	Yes	No indigenous people in the project intervention area.
	7.2. Has the project quantify the groups identified of indigenous peoples?	Na	Not applicable.
	7.3. Has the project determined if there are provisions for a realistic and effective Free, Prior, Informed Consent process, giving a community the right to give or withhold its consent to proposed projects that may affect the lands they customarily own, occupy or otherwise use?	Na	Not applicable.
	7.4. Has the project provided a summary of any reports, specific cases, or complaints that have been made with respect to the rights of indigenous peoples by the Special Rapporteur on the rights of indigenous peoples and that are relevant to the project?	Na	Not applicable.
8. Involuntary Resettlement	8.1. Has the project determined if it is voluntary or involuntary resettlement?	Yes	The establishment of new Hydromet stations is likely to lead to land acquisitions or restrictions on access to land use. However, the land requirements will be very limited and the sites will be located primarily on land in the public domain, and, according to information collected on the ground from municipal authorities and National Meteorological Services, there are enough lands at their possession to meet the needs. Otherwise, the affected people will be fairly compensated. There are also indirect risks of population displacement after the mapping of flood and drought risk areas as some areas could be classified as high risk of loss of life. Based on scientific and factual information, public authorities may then consider relocation or resettlement of the population, or people themselves may decide moving to safer locations, or authorities could propose a new prevention plan to prohibit any future settlement in high-risk areas. <u>Even though this is not part of this project proposal, an integrated safeguarding approach will be defined to minimize the negative impacts.</u>
	8.2. Has the project identified stakeholders whose livelihoods may be affected, directly or indirectly?	No	At the current stage of project preparation, the sites for the establishment of the stations have not yet been identified, and the areas with high risk of loss of life linked to floods and droughts are not known.
	8.3. Has the project identified stakeholders whose assets or access to assets may be affected, directly or indirectly, and if this may lead to resettlement and its consequences including indemnification, compensation, etc.	No	In the event of the establishment of a new Hydromet station, a social assessment will be undertaken by the project to determine the land status of the site. If areas get classified as high risk of loss of life linked to floods and droughts, public authorities may consider relocation or resettlement of the population or prohibition of future settlements in these areas. The project will sensitize government agencies to ensure that, if such measures are considered, dedicated analyses are carried out and adequate measures taken to accompany populations potentially affected by involuntary resettlement measures.
9. Protection of Natural Habitats	9.1. Has the project identified all the critical natural habitats in the region that may be affected? The area considered should be large enough to be credible and be chosen in function of the impact generating agent (e.g. noise) and an appreciation of its propagating ability. The habitats to be considered	No	There are no potential direct risks to the protection of ecosystems, their natural habitats and biological diversity through project activities. The project will not carry out agricultural or other development activities that modify natural habitats.

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Deleted: In the case of involuntary resettlement, the population will be informed of their rights in a timely manner, they will be aware of grievance mechanisms, they will be consulted on their options and offered technical and economic alternatives for resettlement or fair and adequate compensation. Displaced population, if there is any, would face challenges in terms of acquiring resources to live on (house, food and means of subsistence) and social integration in the new communities. The project will ensure that activities, including with local government departments, provide support in terms of strategies or actions in the event of population displacement.

	include all those recognized as critical in any way, be it legally (through protection), scientifically or socially.		The community-led risk mitigation and climate resilience plans will be guided and vetted by the project team to ensure that they promote nature-based solutions and that they do not pose any risks to ecosystems. Support provided to implementation of the plans will be limited to soft measures and not hard infrastructures. Existing and new policies, plans and activities will be reviewed with stakeholders to ensure that critical habitats are protected. In addition, the activities concerned will take into account the characteristics of native species and critical values in defining environmental thresholds.
	9.2. Has the project identified for each critical natural habitat, the mechanism by which it is particularly vulnerable?	No	The project will not undertake activities that may negatively impact natural habitats.
	9.3. Has the project considered all the activities to identify actual risks for each of the natural habitats identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each habitat identified.	No	No project activities likely to alter natural habitats. As noted above, there could be a potential low risk associated with the development of community plans, but their development will be guided and vetted to ensure that they promote nature-based solutions and that they do not pose any risks to ecosystems.
10. Conservation of Biological Diversity.	10.1. Has the project identified all the elements of biodiversity interest in the region that may be affected? The area considered should be large enough to be credible and be chosen in function of the impact generating agent and an appreciation of its propagating ability. It is important in the identification of the elements of biodiversity interests not to limit this to the species level but to include all elements of biodiversity interest, including landscapes, ecosystem processes, habitats, and hydrological cycles, processes of erosion and sedimentation and interactions between taxa. Include all elements enjoying local or international protection	No	The project does not involve activities likely to harm biodiversity or compromise ecosystem services. There will be no direct risks associated with the conservation of biological diversity as the project will not involve any physical action on natural resources beyond construction of new stations, will promote nature-based solutions at community-level, and will not introduce any known invasive species. Some project activities will improve the understanding of natural processes related to the water cycle.
	10.2. For each identified biodiversity element, has the project identified the mechanism by which it is particularly vulnerable? (Changes in flow regime or water quality for a seasonal wetland or disruption of migration routes).	No	No activities likely to affect biodiversity elements, such as change flow regime or water quality for a seasonal wetland or disruption of migration routes.
	10.3. Has the project identified the potential of introducing – intentionally or accidentally – known invasive species?	No	No activities have the potential to introduce new species.
	10.4. Has the project identified the use of living modified organisms resulting from modern biotechnology?	No	No introduction of modified organism is envisaged by the project.
11. Climate Change	11.1. Has the project determined if it belongs to a sector mentioned in the Guidance document for which a greenhouse gasses emission calculation is required? Energy, transport, heavy industry, building materials, large-scale agriculture, large-scale forest products, and waste management.	No	The project does not belong in any sector which requires the calculations of greenhouse gas emissions.
	11.2. Has the project carried out a qualitative risk identification for each of the following drivers of climate change: <ul style="list-style-type: none"> • Emission of carbon dioxide gas from the use of fossil fuel and from changes in land use • Methane and nitrous oxide emissions from agriculture • Emission of hydrofluorocarbons • Perfluorocarbons • Sulphur hexafluoride • Other halocarbons, aerosols, and ozone. 	No	Project activities do not require these analyses. The project does not promote any drivers of climate change (emission of greenhouse gases, fossil fuels, transport, industry, building materials, large-scale pesticide use etc.) or deforestation.
	11.3. Has the project carried out a qualitative risk identification of any impact on carbon capture and sequestration capacity.	No	Not necessary in this project which does not involve activities which might negatively impact carbon sequestration.

	11.3. Has the project identified any climate variability and change impacts?	Yes	<p>(e) The results or outcomes (false alarm or not sufficiently accurate warnings) of the project might occur after floods or drought events, and therefore, citizens and stakeholders might show less preparedness and interest in future events;</p> <p>(f) Insufficient coordination between various stakeholders at different levels in flood or drought management could mean that the potential benefits of project activities will be lower than expected;</p> <p>(g) Insufficient data on areas at risk of flooding or drought, and therefore, citizens and stakeholders might show less preparedness;</p> <p>(h) The multiple recurrence of flood or drought events in some areas of the Basin, and therefore, project activities might be hampered due to the involvement of stakeholders in response and recovery activities.</p>
12. Pollution Prevention and Resource Efficiency	12.1. Has the project identified activities with preventable waste or pollution production?	Yes	The use of batteries at Hydromet stations is susceptible to chemical waste. However, given the low number of batteries, the generation of waste will be relatively low. The project will ensure safe storage conditions for used batteries.
	12.2. Has the project determined the nature and quantity of the waste, as well as those of possible pollutants that may be produced?	No	The nature and quantities of waste produced at the stations will be low and environmental requirements will be sufficient to ensure their proper management. However, the community plans that will be developed during project implementation may identify other type of waste.
	12.3. Has the project determined if the concept of minimization of waste and pollution production has been applied in the design phase and if this will be effective during implementation?	Yes	During the stakeholder consultation process issues related the environmental aspects of the project which includes pollution and waste management have been considered
13. Public Health	13.1. Has the project identified using an appropriate health impact screening tool (check list) potentially significant negative impacts on public health generated?	No	No evidence of this aspect required for the implementation of project's activities.
14. Physical and Cultural Heritage	14.1. Has the project determined if the host country has ratified the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage?	Yes	A file for listing lake Chad as a UNESCO world heritage site has been under consideration since 2018. Insecurity concerns are believed to be behind the halt in the review process.
	14.2. Has the project identified the national and local legal and regulatory framework for recognition and protection of physical and cultural heritage?	Yes	The legal and regulatory framework exists in all participating countries for the recognition and protection of physical and cultural heritage sites.
	14.3. Has the project described in the influence zone all the elements of the cultural heritage, their location and their vulnerabilities? The area considered should be large enough to be credible and be chosen in function of the impact generating agent (e.g. vibrations, landscape elements) and an appreciation of its propagating ability. Include all elements enjoying local or international protection.	No	Project interventions are not likely to jeopardize physical and cultural heritage sites. Flood and drought management at community level could, potentially, lead to some localized impacts (if it is suggested that signage is posted on buildings important to the cultural heritage for example). The participatory design and mapping approach of the project will involve communities and local authorities to identify areas of physical and cultural importance and ensure that community flood and drought management activities will not have a negative impact on them.
	14.4. Has the project determined if any of the heritage elements included in the List of World Heritage in Danger is in the influence zone?	No	There is no evidence related to such, as the project will not result in interventions that would potentially adversely affect physical and cultural heritage sites.
	14.5. Has the project considered all the activities to identify actual risks for each of the heritage elements identified taking into account the specific characteristics of the activity (location, dimension, duration etc.) and the vulnerability mechanism(s) of each heritage element identified?	Yes	No activities likely to harm cultural heritage sites will be undertaken by the project.
15. Lands and Soil Conservation	15.1. Has the project identified the presence of fragile soils within the influence area?	No	The project will not undertake activities likely to degrade soil quality.

	15.2. Has the project identified activities that could result in the loss of otherwise non-fragile soil?	No	No such intervention. The only potential risk pertains to the community plans for climate resilience, but the project will promote the conservation of soil resources and land, including the selection of natural and environmentally friendly solutions.
	15.3. Has the project identified productive lands and/or lands that provide valuable ecosystem services within the influence area?	No	Not necessary for project interventions.
	15.4. Has the project identified activities that may lead to land degradation?	No	The project will not undertake activities likely to degrade soil quality. The only potential risk pertains to the community plans for climate resilience, but the project will promote the conservation of soil resources and land, including the selection of natural and environmentally friendly solutions.

Table A.3.1.6. Risk identification per E&S Principles.

Checklist of E&S Principles	Associated Risk (Low, Medium, High)	Description of Associated Risks
1. Compliance with the law	Low	Relevant national and local authorities have been consulted during the proposal development process to ensure compliance with all relevant laws
2. Access and Equity	Low	There is a risk that all project stakeholders will not have equal access to project benefits. Nevertheless, the stakeholder mobilization activities envisaged by the project will enable vulnerable groups to benefit from the benefits and advantages of the project.
3. Marginalized and Vulnerable Groups	Low	Vulnerable groups, in particular people with disabilities, expressed during the consultations their fears of being excluded from the benefits of the project, if appropriate inclusion measures are not taken by the project.
4. Human Rights	Low	Human Rights are inherent to everyone, regardless of gender, ethnicity, religion, and other status. All project activities will be implemented with strict respect for Human Rights.
5. Gender Equity and Women's Empowerment	Medium	Due to their weak economic power and social prejudices, there is a risk that women will not participate in the same way as men in project activities. The project must ensure that it grants the same opportunities to all beneficiaries. Actions specifically targeting women must be promoted in order to improve their participation and access to benefits.
6. Core Labor Rights	Low	The project will respect all labor agreements and ensure that its workers are treated fairly, while guaranteeing them safe and healthy working conditions.
7. Indigenous Peoples	None	No indigenous people in the project area.
8. Involuntary Resettlement	Medium	The establishment of new Hydromet stations could lead to land acquisition or restriction of access to land. Steps will be taken by the project to build the stations on state land. If the land acquired is held by private persons, they must be compensated fairly and equitably.
9. Protection of Natural Habitats	Low	The project will not intervene in protected areas or implement activities that could fragment ecological corridors as nesting, refuge, feeding or resting sites. However, there might be a low risk associated with the development of community plans, to be managed through appropriate guiding and vetting of the plans, and through a focus of these plans on nature based solutions.
10. Conservation of Biological Diversity	Low	There is no risk that the project activities will lead to risks or negative impacts on the conservation of biodiversity
11. Climate Change	Low	There is no risk that the project will cause greenhouse gas emissions or other drivers of climate change associated with any of its interventions. However, there might be a low to medium risk associated with: <ul style="list-style-type: none"> (i) The results or outcomes (false alarm or not sufficiently accurate warnings) of the proposed activity might occur after floods or drought events, and therefore, citizens and stakeholders will show less preparedness and interest in future events; (j) The lack of coordination between various stakeholders at different levels in flood or drought management, and therefore, the potential benefits of project activities will be lower than expected; (k) Insufficient data on areas at risk of flooding or drought, and therefore, citizens and stakeholders will show less preparedness; (l) The multiple recurrence of flood or drought events in some areas of the Basin, and therefore, project activities will be hampered due to the involvement of stakeholders in response and recovery activities.
12. Pollution Prevention and Resource Efficiency	Low	No risk that the project will cause pollution or degradation of natural resources beyond management of the batteries at the Hydromet stations. The project will contribute to a more efficient use of water resources. There could be a potential risk associated with the community plans for climate resilience, but the project will promote nature-based solutions in these plans, which present low risks of pollution.
13. Public Health	None	There is no risk that the project will cause public health issues.

14. Physical and Cultural Heritage	Low	The project does not involve activities likely to affect Physical and Cultural Heritage. However, there might be a low risk associated with the development of community plans, to be managed through appropriate guiding and vetting of the plans.
15. Land and Soil Conservation	Low	The project will not undertake activities likely to degrade soil quality. The only potential risk pertains to the community plans for climate resilience, but the project will promote the conservation of soil resources and land, including the selection of natural and environmentally friendly solutions.

Table A.3.1.7. Activity identified risks in accordance with the AF's E&S Principles and Potential E&S Impacts.

Activity identified risks in accordance with AF's E&S Principles and Impacts		
Activity	Identified risks in accordance with AF's E&S Principles	Potential E&S Impacts if risks materialize
1.1.1 Carry out a detailed analysis of the Hydromet monitoring system (including weather, surface water, groundwater and water quality), and propose possible upgrades of the existing equipment aiming for state-of-the-art data collection e.g. through the use of the Global Hydrometry Support Facility (WMO HydroHub) Innovations Calls	There is no risk associated with this activity	There is no associated negative impact
1.1.2 Rehabilitate and upgrade old stations and install new stations, including training in operation and maintenance of the stations	There are risks of land acquisition or restriction of access to land linked to the establishment of new stations. The use of batteries at Hydromet stations is susceptible to chemical waste. However, given the low number of batteries, the generation of waste will be relatively low. The project will ensure safe storage conditions for used batteries. The nature and quantities of waste produced at the stations will be low and environmental requirements will be sufficient to ensure their proper management.	People could lose assets, sources of income or livelihood. The impact could result in pollution.
1.1.3 Document and strengthen collaboration and synergies with other projects developing different monitoring methods for the local conditions (remote sensing, AI, crowdsourcing), in order to develop a catalogue of innovative methods and techniques implemented in other countries or in similar conditions that could be applied in the Lake Chad basin and explore their implementation at the regional level	There is no risk associated with this activity	There are no associated negative impacts
1.2.1 Carry out an analysis of the organizational and institutional frameworks of the NMHSs, including the existing legal basis, funding and partnership arrangements, and propose a strategy for sustainable management (operation and maintenance) of monitoring networks	There is no risk associated with this activity	There are no associated negative impacts
1.2.2 Identify and recommend different financing models of the NMHSs - including involving private sector stakeholders - to build value chains for hydrological and meteorological information	There is a risk that private sector participation will increase the cost of hydrometeorological services	For uninformed and poor populations, an increase in the cost of services could result in under-utilization of hydro-meteorological services and products
2.1.1 Perform Quality Assessment and Quality Control of historical data of the stations of the project monitoring network in terms of availability, quality, gaps, completeness in both the national and regional databases, transfer/update of any missing data to the regional database from both ground and satellite-based data (at regional level)	There is no risk associated with this activity	There are no associated negative impacts
2.1.2 Update/define and institute procedures and routines for data acquisition, quality control, and	There is no risk associated with this activity	There are no associated negative impacts

archiving at the LCBC and in the NMHSs of the five participating countries [taking into account the assessment done under 4.1] (both at regional and national levels)		
2.1.3 Upgrade the IT infrastructure (hardware and software, including cloud) to support the operation and transfer of the data from national to regional database (at both regional and national levels)	The level of development of IT infrastructure being different according to the countries (Nigeria being for example more advanced than the others). So, there is a risk that certain countries do not follow the rhythm of technological development.	The harmonization of the system at the regional level could be delayed
2.1.4 Develop/strengthen a regional database management system according to WMO guidelines to meet the needs of all users, including graphical visualization of main observed variables in real time at the key stations of the network (at regional level)	The level of development of IT infrastructure being different according to the countries (Nigeria being for example more advanced than the others). So, there is a risk that certain countries do not follow the rhythm of technological development.	The harmonization of the system at the regional level could be delayed
2.2.1 Define data exchange mechanisms and procedures; update existing procedures (as required), in relation to new and innovative data and information exchange methods taking into account existing WMO data exchange and metadata registration tools (WIGOS, WIS2.0, WHOS, OSCAR)	The level of development of IT infrastructure being different according to the countries (Nigeria being for example more advanced than the others). So, there is a risk that certain countries do not follow the rhythm of technological development.	The harmonization of the system at the regional level could be delayed
2.2.2 Develop/update data sharing protocols according to WMO unified data policy taking into account the relevant agreements developed by LCBC and signed by the 5 countries, including the Water Charter that outlines the responsibilities for operation and maintenance of the regional database management system	The level of development of IT infrastructure being different according to the countries (Nigeria being for example more advanced than the others). So, there is a risk that certain countries do not follow the rhythm of technological development.	The harmonization of the system at the regional level could be delayed
2.2.3 Develop an inventory of existing data and metadata publication tools, web services, data formats, data and metadata standards, and vocabularies within LCBC and Member States (to complement ongoing activities in LCBC's projects such as the Knowledge Management Platform from PROLAC project)	There is no risk associated with this activity	There are no associated negative impacts
2.2.4 Implement free (and open source) data exchange tools and web services supported by WMO and conducting capacity development (to complement ongoing activities in LCBC's projects such as the Knowledge Management Platform from PROLAC project)	There is no risk associated with this activity	There are no associated negative impacts
3.2.1 Launch regional consultations to gather information and make recommendation on: (a) the effective coordination between national and transboundary policies in the context of flood and drought management and climate adaptation; and (b) the information and dissemination modes [regional consultations should be done after the national consultations in 6.1.1]	There is no risk associated with this activity	There are no associated negative impacts
3.2.2. Collect feedback and make recommendations on the needs for interconnection with transboundary policies and present recommendations to policy makers in the five participating countries [in articulation with 6.1]	There is no risk associated with this activity	There are no associated negative impacts

3.2.3. Revise, update, develop and document process and protocols to monitor flood and drought in local pilot areas, at national and regional scale, as well as to act and make coordinated decisions on the development of alerts, dissemination, and responses	There is no risk associated with this activity	There are no associated negative impacts
3.2.4. Design a transboundary EWS mechanism, including regional guidance and advisories by LCBC, taking into account the national needs and transboundary policies gathered under Activities 3.2.1 to 3.2.2 [implementation is under Component 5]	There is no risk associated with this activity	There are no associated negative impacts
3.3.1 Organize WMO HydroHub User-provider Workshops (involving NMHSs, public and private sectors) at regional level and make detailed analysis of the diverse user groups and associated needs	There is no risk associated with this activity	There are no associated negative impacts
3.3.2 Produce a compilation of the respective needs and requirements from the exchanges to improve the performance of NMHSs and explore new markets for NMHSs' services	There is no risk associated with this activity	There are no associated negative impacts
3.3.3 Evaluate entry points for participation of different user groups as identified from their capacities, responsibilities, habits for example through partnerships for data collection and sharing, updating or setting up of monitoring networks and user feedback on monitoring and EWS services in terms of quality and usefulness	There is no risk associated with this activity	There are no associated negative impacts
3.3.4 Collectively (providers and users) define recommendations for cooperation and active communication to ensure that services are continuously tailored and improved	There is no risk associated with this activity	There are no associated negative impacts
3.1.1 Conduct a detailed Climate Risk Assessment of the Lake Chad Basin, including field studies, to identify vulnerability and exposure to risk factors; and create climate risk registers and catalogs disaggregating data by gender and age categories	There is no risk associated with this activity	There are no associated negative impacts
3.1.2 Training on the use and assessment of global and regional numerical weather prediction model outputs (such as quantitative precipitation forecasts), as well as sub-seasonal to seasonal meteorological forecasts, for the Lake Chad basin to help in estimating runoff/streamflow in S2S scale (feeding into HydroSOS products), and also forecast floods and droughts in the Lake Chad basin in order to improve the LCBC planning	There is no risk associated with this activity	There are no associated negative impacts
3.1.3 Disseminate information among stakeholders and assess the impacts of climate change and future risks in different sectors (including for food security and environmental services) and to gather feedback for improving products and services	There is no risk associated with this activity	There are no associated negative impacts
3.1.4 Conduct a willingness-to-pay (WTP) survey among stakeholders to gather feedback on most preferred climate-related products and services which could be paid for by policy makers and community dwellers as part of sustainability considerations for DRR and food	There is no risk associated with this activity	There are no associated negative impacts

security [associated with 3.1.3, 5.2.1, 5.2.2, 6.1.2, 6.2.2]		
3.4.1 Carry out a detailed analysis of hydrological forecasting tools and EWS (related to floods and droughts) within the participating countries and at the regional level, with a view of determining possible upgrades of the existing systems and mechanisms for a state-of-the-art (impact-based) EWS	There is no risk associated with this activity	There are no associated negative impacts
3.4.2 Structure the processes to scale up the use of meteorological and hydrological observation and monitoring methods based on remote sensors (e.g. satellite altimetry, Raincell) applied in Chad, and analyze the feasibility of such methods in pilot areas of Lake Chad [in articulation with 1.1.3]	There is no risk associated with this activity	There are no associated negative impacts
3.4.3 Undertake extreme value analysis for the determination of flood and drought risk thresholds for the various hazard-prone areas of the Lake Chad basin, as well as thresholds based on historical events in consultation with technical services and local representatives	There is no risk associated with this activity	There are no associated negative impacts
3.4.4 Develop a flow forecasting information system for the Lake Chad basin taking into account various available and existing models, and establish a framework for comparison and analysis of information adapted to forecasters and operators	There is no risk associated with this activity	There are no associated negative impacts
3.5.1 Apply the Global Hydrological Status and Outlook System (HydroSOS) concept, standards and tools, explore the improvement and the development of products based on available Hydromet information (in situ and remotely sensing data), if available local models and downscaling of global models to provide a comprehensive overview of the state of the basin's water resources as well as the hydrological outlook for the coming weeks and months (seasonal to sub-seasonal time scales)	There is no risk associated with this activity	There are no associated negative impacts
3.5.2 Update/set up a web portal to disseminate the Lake Chad basin related HydroSOS products (at country and regional level and to the HydroSOS global portal) [linked with the Lake Chad Information System (LIS)]	There is no risk associated with this activity	There are no associated negative impacts
3.5.3 Sensitize and train NMHSs, national and regional institutions and research centers on the different uses of Lake Chad Basin water resources information. Produce easy-to-digest (or understandable) bulletins (as outputs of HydroSOS portals) for hydrological status and outlooks based on the user requirements, to assist users and policy makers in decision making	There is no risk associated with this activity	There are no associated negative impacts
4.1.1 Undertake an assessment of existing operating procedures and human resources capacities for Hydromet monitoring and data management making use of the WMO HydroHub Capacity and Needs Assessment; and in collaboration with all relevant stakeholders, develop recommendations and a proposal for an	There is no risk associated with this activity	There are no associated negative impacts

organizational reform strategy with an action plan to enhance institutional arrangements in the five countries of the Lake Chad basin		
4.1.2 Develop a needs-based training programme and action plan for staff from national and regional institutions and deliver tailored training for the development of project activities	There is no risk associated with this activity	There are no associated negative impacts
4.2.1 Train/reskill relevant NMHSs and LCBC staff in installation, maintenance and management of monitoring stations, including quality assurance, quality control aspects, data transmission and maintenance of equipment according to WMO standards and safety	There is no risk associated with this activity	There are no associated negative impacts
4.2.2 Train/reskill LCBC and NMHSs' staff in data management and information systems made available, including strengthening/development of hydrological information products and mechanisms for data and metadata interoperability in LCBC and NMHSs	There is no risk associated with this activity	There are no associated negative impacts
4.2.3 Reskill monitoring station observers and train them in the operation and maintenance of new generation hydrometeorological equipment, prevention of vandalism and in the importance of sustaining observations	There is no risk associated with this activity	There are no associated negative impacts
5.1.1 Organize awareness-raising activities for decision-makers, legislators and water users, including through the WMO HydroHub Ministerial Roundtables. Dialogues organized in the last year of the project's development should, as far as possible, use the benefits of the project's activities as an illustration (showcase cost-benefits and added value of Hydromet services)	There is no risk associated with this activity	There are no associated negative impacts
5.1.2 Develop a gender-responsive stakeholder engagement strategy and action plan for continuous engagements with key stakeholders, including Civil Society Organizations (CSOs), private sector, government departments and local community representatives	There is no risk associated with this activity	There are no associated negative impacts
5.1.3 Implement the stakeholder engagement strategy and action plan (developed under Activity 5.1.2) and institutionalize the process to ensure continued engagement beyond project implementation	There is no risk associated with this activity	There are no associated negative impacts
5.2.1 In close co-operation with users, develop appropriate user feedback mechanisms and identify novel and user-friendly channels that allow continuous feedback and engagement from all users of hydrometeorological services	There is no risk associated with this activity	There are no associated negative impacts
5.2.2 Implement and institutionalize the user feedback mechanisms to ensure continued improvement of hydrometeorological products and services	There is a risk that all the users will not participate equally in the process of improvement of hydrometeorological products and services	The improvement needs of certain social groups, particularly vulnerable groups, may not be taken into account
5.3.1 Following the design prepared under Component 3, implement at LCBC a hydro-meteorological information system that would provide regional guidance and advisories based on data regularly received at	There is no risk associated with this activity	There are no associated negative impacts

regional level from the stations to updating the regional database		
5.3.2 Develop school learning and communication materials (including in local languages) for practitioners, policy makers, parliamentarians, women and youth, including videos, websites, brochures, radio announcements etc, in collaboration with national agencies	There is no risk associated with this activity	There are no associated negative impacts
5.3.3 Organize upscaling of contingency planning at community level, building on the experience in the pilot communities [in articulation with 6.1]	There is no risk associated with this activity	There are no associated negative impacts
5.4.1 Engage communities to develop, test and evaluate last-mile arrangements to ensure that warnings and advisories are understandable and actionable for the most vulnerable populations (including women, children and the elderly)	There is no risk associated with this activity	There are no associated negative impacts
5.4.2 Organize the development of community contingency plans that are inclusive and gender responsive in pilot communities and support to bring them into service	There is a risk that all members of the community will participate equally in the development of contingency plans	The needs of certain social groups, particularly vulnerable groups, may not be taken into account in the development of contingency plans
5.4.3 Organize meetings and training sessions for the population in the pilot sites in the five countries on the interpretation of information disseminated through official channels that are part of the inclusive early warning system (designed under Component 3), ensuring equal participation of men and women, and share lesson learned	There is no risk associated with this activity	There are no associated negative impacts
6.1.1 Organize and conduct national workshops to identify gaps and needs in policies and plans, and to highlight and make recommendations for key long-term strategies for integrated flood and drought management	There is no risk associated with this activity	There are no associated negative impacts
6.1.2 Based on the detailed Climate Risk Assessment developed in 3.1.1, and in conjunction with the relevant stakeholders, develop a gender-responsive basin-level drought management plan and flood management plan	There is no risk associated with this activity	There are no associated negative impacts
6.1.3 Institutionalize the flood and drought management plans in major institutions in the Lake Chad Basin	There is no risk associated with this activity	There are no associated negative impacts
6.1.4 Organize and conduct workshops (at least one per country) on the Training Manual for Gender Mainstreaming in Flood and Drought Risk Forecasting and Management with participants from NMHSs, local decision makers, civil authorities, women and community organizations, etc.	There is no risk associated with this activity	There are no associated negative impacts
6.1.5 Develop policy briefs and support integration of flood and drought management and climate resilience in policies, plans, strategies, and laws	There is no risk associated with this activity	There are no associated negative impacts
6.2.1 Develop a national roadmap or action plan for the establishment of community-led risk mitigation and climate resilience plans, including the selection of priority catchments/communities including gender, youth and other social criteria as critical to determine	There is no risk associated with this activity	There are no associated negative impacts

vulnerability for pilot implementation under this proposed project		
6.2.2 Cost potential community level risk mitigation and climate resilience measures in the Lake Chad Basin and identify potential sustainable financing strategies	There is no risk associated with this activity	There are no associated negative impacts
6.2.3 In priority selected catchments, develop and implement community-led and gender responsive risk mitigation and climate resilience plans	There are potential risks linked to the content of the plans which could, if unguided, include activities with negative social and environmental impacts. In some rural communities, patriarchy is the rule and attitudes are changing very slowly. There is a risk that these plans do not take into account the specific needs of women and marginalized and vulnerable groups.	The community plans could result in environmental degradation or social impacts. The impact could result in a deterioration of the socio-economic situation of women and vulnerable and marginalized groups

Categorization

Based on the above analysis, the project outputs/activities were characterized according to the scale, nature and severity of their potential environmental and social impacts (**Table A.3.1.8**) and classified in terms of significance of the risk.

Table A.3.1.8. Categorization definition.

Questions	Component 1 Yes/No	Component 2 Yes/No	Component 3 Yes/No	Component 4 Yes/No	Component 5 Yes/No	Component 6 Yes/No
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are diverse?	No	No	No	No	No	No
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are widespread?	No	No	No	No	No	No
Does the Project Outputs / Activities have significant adverse environmental or social impacts that are irreversible?	No	No	No	No	No	No
Does the Project Outputs / Activities have few adverse environmental or social impacts?	Yes	No	No	No	No	Yes
Does the Project Outputs / Activities have in small scale / low widespread adverse environmental or social impacts?	Yes	No	No	No	No	Yes
Does the Project Outputs / Activities have reversible or easily mitigated adverse environmental or social impacts?	Yes	No	No	No	No	Yes
Does the Project Outputs / Activities have no adverse environmental or social impacts?	No	Yes	Yes	Yes	Yes	No
Categorization	B	C	C	C	C	B

Table A.3.1.9. Significance of the Risk

Evidence-based Risk Identification			
Checklist of E&S Principles	Risk identified per E&S Principles and potential impacts	Impact and probability (1-5)	Significance (Low, Moderate, High)
1. Compliance with the law	Relevant national and local authorities have been consulted during the consultative process to ensure compliance with all relevant laws. Project activities will be implemented in alignment and compliance with national and international regulatory and policy frameworks signed by the participating countries. The prevailing insecurity in several areas of the Lake Chad Basin must lead the States and the project to take measures to ensure the safety of the populations and the project workers.	Low	Low
2. Access and Equity	There is a risk that not all beneficiaries may be able to access project benefits due to the social background, resources and level of education of certain people and social groups. The stakeholder mobilization activities envisaged by the project will enable vulnerable groups to benefit from the project. The project will promote the equitable access to activities and assets by women, youth, elders	Low	Low

	and people with disabilities in targeted communities as well as equal and inclusive participation from both men and women in decision making processes. Further, the project foresees capacity building activities in which only a small percentage of communities will be able to participate. The project will ensure that these community representatives are future trainers who disseminate information to the wider groups. In this regard, training materials must be carefully prepared for targeted audiences to facilitate community representatives disseminate information for locals. In addition, the project will be advertised broadly through the mass media (radio, social media, town hall and village meetings, workshops etc.) to improve stakeholders' engagement.		
3. Marginalized and Vulnerable Groups	There is a risk that vulnerable and marginalized groups do not have sufficient knowledge and access to technological devices such as mobile phones or lack of good telephone connection especially required for access to information. The project is therefore designed to provide an equal share of benefits to vulnerable groups, such as women and youth. A gender action plan has been prepared to address barriers and meet needs of those groups, and participatory approaches will be adopted. The project will empower vulnerable groups to make decisions on concrete adaptation actions, valuing their traditional and local knowledge. In addition, to avoid the exclusion of marginalized and vulnerable communities, local radio channels and traditional practices such as the 'Arabic telephone' will be implemented to reach these groups, particularly women, girls, the elderly and people with disabilities.	Low	Low
4. Human Rights	No risk of human rights violation. However, there is a prevalence of violence against women and girls rooted in patriarchal and traditionalist communities. The project will mainstream training on Human Rights into all training activities.	Low	Low
5. Gender Equity and Women's Empowerment	There is a risk that women may not be able to fully access project benefits or participate in project activities. The proposed project targets a region where men hold the majority of leadership positions. Women's participation in disaster preparedness and decision-making is often limited due to cultural and social norms. There is therefore a risk that women will not benefit equally from the proposed adaptation measures and capacity development interventions. The gender action plan developed, the gender-responsive stakeholder engagement strategy included as one activity of this project, and the mobilization of the <i>Training Manual for Gender Mainstreaming in End-to-End Early Warning System for Floods and Integrated Drought Management through a Participatory Design Approach</i> will ensure that women and representatives of women's groups are fully involved.	Medium	Moderate
6. Core Labor Rights	No risk of violation of labor rights. In response to any risk of mistreatment or discrimination, the project will at all times ensure workers' rights are respected at all times and upheld to international and national labor laws and codes.	Low	Low
7. Indigenous Peoples	Not Applicable. All population groups in the area will be consulted and involved during the design and implementation of the project activities. To be considered indigenous, people must meet all the following criteria: (i) self-identification; (ii) collective attachment to geographically distinct habitats; (iii) customary cultural economic, social or political institutions that are distinct or separate from those of the mainstream society; (iv) a distinct language or dialect, different from the official language or languages of the country or region in which they reside; (v) State recognition as an indigenous people. The project area of intervention does not contain indigenous people recognized as such by the governments of the five countries. However, it is recognized that the traditional knowledge of people on floods and droughts will be useful in the preparation of risk maps, early warnings and dissemination of information, and therefore considered in the proposed project. The traditional use of natural resources, the irrigation system and land use may be a challenge. Therefore, a detailed analysis will be carried out by local and national institutions during project implementation, in order to understand the traditional use of natural resources, especially with regard to water and land.	NA	NA
8. Involuntary Resettlement	The project will not create direct involuntary resettlement of communities. However, indirect risks of population displacement after the mapping of flood and drought risk areas could be possible as some areas could be classified as high risk of loss of life. Based on scientific and factual information public authorities institutions may then consider relocation or resettlement of the population, or people themselves may decide moving to safer locations.	Low	Low

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	In addition, activities relating to the rehabilitation and installation of new stations (Component 1) are likely to generate negative impacts in terms of land acquisition, and restriction of land use. Nevertheless, the project will ensure that land belonging to private individuals will not be used, otherwise the affected people will be fairly compensated. According to information collected on the ground from municipal authorities and National Meteorological Services, there are enough lands at their possession to meet the needs. Even though the population displacement caused by floods or other climate-related disasters is not related to project activities, an integrated safeguarding approach will be defined to minimize the negative impacts.		
9. Protection of Natural Habitats	There are no potential direct risks to the protection of ecosystems, their natural habitats and biological diversity through project activities. There is a possibility of indirect risks through community-level risk mitigation and climate resilience plans and revised national and transboundary policies and plans that could, if unguided, decrease the level of protection of critical habitats and health of ecosystems. Natural and nature-based solutions will be promoted using for example the World Wildlife Fund (WWF) Green Flood Guide , but will not be implemented during the project as it would require additional project activities and funding.	Low	Low
10. Conservation of Biological Diversity	There will be no direct risks associated with the conservation of biological diversity as the project will not involve any physical action on natural resources beyond construction of new stations, will promote nature-based solutions at community-level, and will not introduce any known invasive species. Some project activities will improve the understanding of natural processes related to the water cycle. Nevertheless, the project outputs (flood and drought risk maps, information on EWS) could lead to encroachment on protected areas, buffer zones and natural habitats. The project will promote the planning of biodiversity conservation activities, such as reforestation, nature-based solutions, through evaluation of pilot sites with relevant national institutions and communities. The project will promote capacity building and peer learning to strengthen the effective management of natural resources, including aquatic species, animals, and forests.	Low	Low
11. Climate Change	There is no risk that the project will cause greenhouse gas emissions or other drivers of climate change associated with any of its interventions. The project seeks to enhance water resources management for better climate resilience of the population severely affected climate change. It will disseminate information among stakeholders and assess the impacts of climate change and future risks in different sectors (including for food security, water supply and environmental services). In addition, actions aimed at increasing the resilience of populations will be planned at the local level with a focus on nature-based solutions.	Low	Low
12. Pollution Prevention and Resource Efficiency	No risk that the project will cause pollution or degradation of natural resources, except for management of waste (batteries) in hydromet stations. The project will contribute to a more efficient use of water resources. The project will build technical and organizational capacity for water efficiency at national and transboundary levels with clear guidelines, policies, and action plans. There could be a potential risk associated with the community plans for climate resilience, but the project will promote nature-based solutions in these plans, which present low risks of pollution.	Low	Low
13. Public Health	There is no risk that the project will cause public health issues. The project will identify at-risk communities that are prone to flooding and sensitize them to best practices in health security through various capacity building activities. The project will promote the planning of a health surveillance programme to cope with disasters. The project will regularly promote, inform and sensitize the population on diseases related to stagnant water (malaria, typhoid fever, amebiasis, cholera, etc.).	Low	Low
14. Physical and Cultural Heritage	The project does not involve activities likely to affect Physical and Cultural Heritage. A file for listing lake Chad as a UNESCO world heritage site has been under consideration since 2018. Insecurity concerns are believed to be behind the halt in the review process. The participatory design and mapping approach of the project will involve communities and local authorities to identify areas of physical and cultural importance and ensure that community flood and drought management activities will not have a negative impact on them.	Low	Low
15. Lands and Soil Conservation	The project will not undertake activities likely to degrade soil quality. The only potential risk pertains to the community plans for climate resilience, but the project will promote the conservation of soil resources and land, including the selection of natural and environmentally friendly solutions. The project will contribute to	Low	Low

Deleted: , involuntary resettlement

Deleted: effects of involuntary resettlements if they take place

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	improving the resilience of communities by providing hydrometeorological products and services adapted to the needs of farmers and agricultural technicians and by helping them identify solutions to increase their resilience, with a focus on nature-based solutions. The project will not intervene in the financing of agricultural investments likely to contribute to soil degradation.		
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With the risks identification per E&S Principles, the proposed project is categorized as C according to the categories established in the ESP. Category C projects/programmes are those with no adverse environmental or social impacts.

A3.2 ENVIRONMENT AND SOCIAL RISK MANAGEMENT PLAN (ESRMP)

Environment and social management plan

The above cross-analysis of the activities planned by the project and field surveys in the national portions of the Lake Chad Basin in the five countries made it possible to identify the positive and negative impacts of the project, and propose mitigation, compensation, or improvement measures according to the impact categories. The **Table A.3.2.1** presents the identified risks and the mitigation measures.

Table A.3.2.1. Identified risks and possible mitigation measures.

Checklist of environmental and social principles	Identified Risk	Level	Mitigation measures
1. Compliance with the Law	The project activities will be implemented in compliance with relevant laws, regulations and acts of the participating countries.	None	Project activities do not need mitigation measures since they generate no risks.
2. Access and Equity	There is a risk that all project stakeholders will not have equal access to project benefits.	Low	The stakeholder mobilization activities envisaged by the project will enable vulnerable groups to benefit from the project. The project will promote the equitable access to activities and assets by women, youth, elders and people with disabilities in targeted communities as well as equal and inclusive participation from both men and women in decision making processes.
3. Marginalized and Vulnerable Groups	Vulnerable groups, in particular people with disabilities, expressed during the consultations their fears of being excluded from the benefits of the project, if appropriate inclusion measures are not taken by the project.	Low	The project will empower marginalized and vulnerable groups to make decisions on concrete adaptation actions, while strengthening their skills.
4. Human Rights	Human Rights are inherent to everyone, regardless of gender, ethnicity, religion, and other status. All project activities will be implemented with strict respect for Human Rights.	Low	The project will mainstream training on Human Rights into all training activities.
5. Gender Equity and Women's Empowerment	Due to their weak economic power and social prejudices, there is a risk that women will not participate in the same way as men in project activities.	Medium	The gender-responsive stakeholder engagement strategy included as one activity of this project will ensure that women and representatives of women's groups are fully involved. In addition, a gender plan has been prepared (Annex 4) to strengthen gender equality and project interventions will focus on promoting fair and equal development in the intervention areas.
6. Core Labor Rights	In response to any risk of mistreatment or discrimination, the project will at all times ensure workers' rights are respected at all times and upheld to international and national labor laws and codes.	Low	The project will respect all labor agreements and ensure that its workers are treated fairly, while guaranteeing them safe and healthy working conditions.
7. Indigenous People	The project area of intervention does not contain indigenous peoples recognized as such by the States.	None	Project activities do not need mitigation measures since they generate no risks.
8. Involuntary Resettlement	<u>No involuntary resettlement will result from proposed project activities. While not all sites for the proposed network of hydrometeorological stations have been identified at this stage, site selection will focus on the rehabilitation and modernization of existing, brownfield sites. On these</u>	<u>Low</u>	The project will ensure that land belonging to private individuals will not be used, otherwise the affected people will be fairly compensated. According to information collected on the ground from local authorities and

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	<p>sites, impacts to local communities will be limited to a short-term increase in traffic with limited and reversible adverse impacts. In the event that greenfield installations are required, environmental and social impacts will be limited to the short-term impacts of civic works. However, given the small footprint of proposed works and the pre-existing availability of public land available for project activities, these works will not result in involuntary resettlement.</p>		<p>NMHS, there are enough lands in their possession to meet the needs. It should be understood that population displacement caused by floods or other natural disasters is not related to project activities.</p>
9. Protection of Natural Habitats	<p>The project will not intervene in protected areas or implement activities that could fragment ecological corridors as nesting, refuge, feeding or resting sites. However, there might be a low risk associated with the development of community plans.</p>	Low	<p>Guidelines will be issued on the preparation of the action plans to ensure that they do not include actions that could have some negative social or environmental impacts and the action plans will be vetted by the project team; the action plans will prioritize nature-based solutions; in addition, support to implementation will be limited to soft support to assist the communities in advancing towards implementation and no hard infrastructure investment will be supported.</p>
10. Conservation of Biological Diversity	<p>The project will not intervene in protected sites and will aim to preserve biodiversity through better management of water resources.</p>	None	<p>Project activities do not need mitigation measures since they generate no risks.</p>
11. Climate Change	<p>The project will not have any negative impact on climate change. The project does not promote any drivers of climate change. However, there might be a low to medium risk associated with:</p> <ul style="list-style-type: none"> (m) The results or outcomes (false alarm or not sufficiently accurate warnings) of the proposed activity might occur after floods or drought events, and therefore, citizens and stakeholders will show less preparedness and interest in future events; (n) The lack of coordination between various stakeholders at different levels in flood or drought management, and therefore, the potential benefits of project activities will be lower than expected; (o) Insufficient data on areas at risk of flooding or drought, and therefore, citizens and stakeholders will show less preparedness; (p) The multiple recurrence of flood or drought events in some areas of the Basin, and therefore, project activities will be hampered due to the involvement of 	Low to Medium	<ul style="list-style-type: none"> (a) Stakeholders and citizens will be consulted and provided with the short and long-term benefits of the project activities and with highlights of the lesson learnt and the ways in which it could be improved over the time; (b) The project partners will ensure the stakeholders are involved into coordination at all levels; (c) The data availability will be ensured through the involvement of stakeholders and communities, and through building synergies with the ongoing and future national and international projects (see list in Part II, section K.) on floods and drought management; (d) The project partners will provide support to manage and collect all the new information for drafting the (Return of Experience) report.

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Deleted: In this case the government of each participating country should provide help and support to the displaced population.

Deleted: Activities relating to the rehabilitation and installation of new stations (Component 1) are likely to generate negative impacts in terms of land acquisition, restriction of land use, involuntary resettlement.

	stakeholders in response and recovery activities.		
12. Pollution Prevention and Efficiency	The project will not pose any risks to resource efficiency or pollution for water, land or and other environmental components. However, there might be a low risk associated with the development of community plans.	Low	Guidelines will be issued on the preparation of the action plans as described under item 9. above.
13. Public Health	The project is aiming at reducing climate vulnerabilities and increase coping capacities of targeted communities through a climate risk management integrated approach. There is no risk that the project will cause public health issues.	None	Project activities do not need mitigation measures since they generate no risks.
14. Physical and Cultural Heritage	The project does not involve activities likely to affect Physical and Cultural Heritage. However, there might be a low risk associated with the development of community plans.	Low	Guidelines will be issued on the preparation of the action plans as described under item 9. above.
15. Land and Soil Conservation	The project will not have negative impacts on lands and soil conservation. However, there might be a low risk associated with the development of community plans.	Low	Guidelines will be issued on the preparation of the action plans as described under item 9. above.

Monitoring and evaluation program

Monitoring and evaluation system

Project Monitoring and Evaluation (M&E) will be under the oversight of the Project Management Unit (PMU) and the Project Manager and led by the M&E officers who will work closely with the implementing, executing and national partners. The M&E system should: (i) collect gender-disaggregated data in meeting the gender targets in compliance with the AF Gender Policy; collect data on the AF indicators; produce, organize and disseminate the information needed for the strategic management of the project; (ii) document the results and lessons learned for internal use and for public dissemination on the achievements, and (iii) respond to the information needs of Adaptation Fund, Partners and the Governments on the activities, immediate outcomes and impact of the project. A Project Implementation Manual (PIM) including monitoring and evaluation will describe a simple and effective system for collecting, processing, analyzing and disseminating data. The PIM will be prepared project inception, i.e. within the first 6 months of project implementation.

Monitoring and Evaluation aims, on the one hand, to inform that the proposed actions are implemented as planned and within the established deadlines and, on the other hand, that the expected results are achieved. When deficiencies or difficulties are observed, Monitoring and Evaluation will make it possible to initiate the appropriate corrective measures. A monitoring plan will be drawn up which will indicate the monitoring parameters, benchmarks and designate the persons or institutions who will be in charge of the monitoring activities.

Arrangements for the monitoring and evaluation of environmental and social activities will be part of the overall monitoring program for the entire project.

Major responsibilities for actors for Environmental and Social Risks monitoring for project and sub-project activities as well as for implementing adequate measures through ESRMP are presented in **Table A.3.2.2.2**.

Table A.3.2.2. Responsibility for Actors for Environmental and Social Risks monitoring for project and sub-project activities as well as for implementing adequate measures through ESRMP.

Actor involved	Responsibility/Assignments for risks identification and monitoring under project/sub-project activities	Supporting Entity	Responsibility/Assignments for implementing measures
PMU, with the support of project Partners	Development of Environment and Social Management systems (ESMS) comprising: (i) identification (screening of compliance with ESP of AF and national laws) environment and	- Executing Entities - External consultant - National Environment and	- Ensure safeguard action are defined in compliance with the national regulations and implemented for the activities which can create social and environmental risks - Supervise the implementation of the response activities under the ESRMP in

	social risks for the sub-project activities; (ii) preparation of ESIA and ESRMP for the sub-projects prior to the start of the sub-projects activities; and, (iii) regular monitoring and dissemination of the ESIA and ESRMP (with grievance mechanism) for the sub-projects and projects.	Social agencies in each country	coordination with the bodies responsible for the management of water, environment and social welfare of each country - Monitor the progress of the risks minimizing actions or measures with the executing partners - Carry out further assessment for the risks which have been encountered to avoid similar cases in other activities
Project Partners	- Support for the study - Contact lists of people to consult for ESIA in the countries - Inception and validation meeting of the ESIA report - Distribution and awareness of the ESIA and ESRMP report to the stakeholders	- Executing Entities - National Environment and Social agencies in each country	- Follow-up of the study and implementation of the activities of the ESRMP in relation to the bodies responsible for the management of water and environment of each country - Monitor the progress of the risks minimizing actions and measures with the help of checklists or consultation
National Partners	- Provide support for the study - Divulge information on the potential risks which could result - Inception and validation of the ESIA report	- Executing Entities - External consultant	- Identify potential risks which could result from the activities at the very initial stages especially at the design or planning stage - Monitor the implementation of the activities during and after the completion - Implement supportive actions to the populations in order to leverage the impact
Sub-national Partners	- Provide support for the study - Contribution to identification of the safeguard action through evidence-based knowledge - Divulge information on the potential risks which could result	- Executing Entities - External consultant	- Implement supportive actions to the populations in order to leverage the impact

Indicators and data collection

Environmental and social performance indicators were discussed during the field consultations, as well as measures to mitigate the identified impacts. Some indicators likely to be monitored are presented below:

1. Number of people trained on the products and services developed by the project and disaggregated by gender;
2. Climate related hazards information generated and disseminated to stakeholders on a timely basis;
3. Percentage of targeted population aware of predicted adverse impacts of climate related hazards (flood and drought), and of appropriate responses;
4. Regional hydrometeorological information systems developed and functioning, ensure sustainable management of natural resources;
5. Data exchange mechanisms and procedures developed and functioning;
6. Percentage of households and communities having more secure access to livelihood assets;
7. Hydrometeorological products and services provided and used by users;
8. Operating level of infrastructure and tools made available through the project;
9. Hydrometeorological information and services help decision-makers prevent risks related to climate-hazards;
10. Number of new Hydromet stations installed;
11. Number of new Hydromet stations rehabilitated;
12. Percentage of targeted population adopting adaptation and mitigation measures proposed by the project.

Local people and communities as well as their representatives will be continuously involved in the decision-making related to the diversity of project interventions. Local people/communities and their representatives will be properly placed to take care of the needs of local stakeholders and to promote the local resource management capacity.

Grievance Mechanism

The Grievance mechanism will be developed for the beneficiaries of the project to address or report any complaints or discrimination directly to the Designated Authorities, Implementing Entity (WMO) and Funding Agency (Adaptation fund). This Grievance mechanism was prepared based on the field consultations and taking into account the related activities in the Implementing Entity (WMO). There are several means (using

emails, social media or through posts and regular mail) through which one can report the concerns they may have or find during activity design and implementation, or any suggestion for improvement. A dedicated telephone number will be available so that the concerns are reported anytime and can be addressed in a short time. In addition, complaints/grievances books will be provided at the level of the focal point of LCBC, GWP-CAf, the main towns of rural communities, the sub-prefectures, prefectures office. At the end of every activity, there will be a feedback mechanism through short survey questionnaire to receive comments or suggestions from the participants (individually or in groups) to improve the shortcomings in future activities. The response and feedback to any concerns will be carried out in a transparent and effective manner, making sure that the identity of the person will be kept confidential, if requested.

These grievance mechanisms will be made available to all communities (or additional mechanism will be identified during the implementation of the project) specially to consider the special needs of different groups as well as have gender sensitive approach in the project area.

At the Implementing Entity level, the grievance mechanism will be regularly monitored for the complaints from the beneficiaries or stakeholders who will share their feedbacks directly through regular mail, phone, fax or email using the details below.

World Meteorological Organization

7bis, avenue de la Paix
Case Postale No. 2300
CH-1211 Geneva 2, Switzerland
Tel.: + 41 (0) 22 730 81 11
Fax: + 41 (0) 22 730 81 81
E-mail: wmo@wmo.int

Furthermore, there are two online forms, available at <https://public.wmo.int/en/about-us/contact-us> and at <https://public.wmo.int/en/about-us/planning-finance-accountability/internal-oversight-office/report-fraud-corruption-or-abuse>, that can be filled in for reporting and to receive prompt action or fulfil the needs of the beneficiaries.

The complaints can also be directly submitted to the secretariat of the Adaptation Fund at the following address:

Adaptation Fund Secretariat/Board
c/o Global Environment Facility
MSN P-4-400 1818 H Street NW Washington DC 20433 USA
Tel: +1.202.478.7347
Fax: +1.202.522.3240
Email: afbsec@adaptation-fund.org

The complaints reported or received will be handled by the project management unit, who will investigate firstly through an on-site visit. The visiting team may invite other relevant agencies (local/national/transboundary) to participate in the investigation. During the investigation, the root causes of the risks or issues will be identified and the concerned individuals or agencies responsible for correcting or resolving the issue will be assigned. The team will produce a report of its findings such as causes of issues, involvement of concern agencies, time taken to resolve, recommendations and actions. Complainants may request or will be sent a copy of the reports related to the complaint. All the complaints (if received any) and measures taken will be stored in a database of the project management unit and will also be reported to the Adaptation Fund along with the yearly progress report.

A.3.3 LIST OF STAKEHOLDERS CONSULTED AND FIELD MISSION PICTURES

Table A.3.3.1. List of Stakeholders Consulted (Officials of institutions met).

Date et location	Name	Affiliation/Structure	Position
Country: Chad			
12/12/22 N'Djamena	Sakine Youssouf Botchomi	National Meteorology Agency (ANAM)	Managing Director
12/12/22 N'Djamena	Hamid Abakar Souleymane	National Meteorology Agency (ANAM)	Deputy Managing Director
12/12/22 N'Djamena	Djasrabe Ngumadjita	Water Resources Directorate	Deputy Director of Water Resources
12/12/22 N'Djamena	NARADOU TOUSSAINT Analyst	Water Resources Directorate	Analyst

13/12/22 N'Djamena	Abdelkerim Adam Koulbou	SODELAC - Société de Développement du Lac Tchad	Managing Director
13/12/22 N'Djamena	Abakar Mohamed Kaila	SODELAC - Société de Développement du Lac Tchad	Technical Director
13/12/22 N'Djamena	Pismon Doussoue	SODELAC - Société de Développement du Lac Tchad	Head of Monitoring & Evaluation and Statistics Division
13/12/22 N'Djamena	ABDELKERIM KODBE	OHD - Organisation Humanitaire et de Développement	Country coordinator
13/12/22 N'Djamena	DJAMAL ABDEL-NASSER CHERIF NEISSA	Ministry of Environment, Water and Fisheries	PNE-CHAD PRESIDENT
13/12/22 N'Djamena	MAHAMAT MAMADOU ELOPHI	NGO- Sauvons le Lac Tchad	Coordinator
13/12/22 N'Djamena	BRAHIM ABAKAR MALLOUMI	NGO- Sauvons le Lac Tchad	Financial and Administrative Manager
15/12/22 BOL	GUILDJA TCHARI DALLAH	Traditional Chiefdom	Representative of Canton Chief
16/12/22 BOL	AHMAT WARI of CADELAC	NGO / CADELAC	General Secretary
Country: Cameroon			
20/12/22 Kousseri	Ngoulsia Yaouna	Departmental Transport Service	Director of Transport services
20/12/22 Kousseri	Aboubacar Sali Adouin Mbnag	Departmental Transport Service	Hydromet station Manager
21/12/22 Kousseri	Abicho Mahamat	PROLAC – Lake Chad Region Recovery and Development Project	Coordinator
21/12/22 Kousseri	Itta Kalia Amazia Mahamat Lontsi SoB Hubert - SSE/CC Talousso Flaubert	PROLAC – Lake Chad Region Recovery and Development Project	Component Managers
21/12/22 Kousseri	Prof Madi Ali	PDRI-CL- Chari-Logone integrated rural development project	Coordinator
21/12/22 Kousseri	Marouf Mahamat /UAMC-LC Mansour Adam Djibrine/COPAD Abba Hassan /REDCO Koumbi Idriss Abdoulaye Mahamat/Bonheur du L&C Adoum Ali /Representative of disaster victims and people with disabilities	NGO and Associations	NGO Coordinators
22/12/22 Kousseri	Mahamat ABBA	Traditional Chiefdom	Sultan
23/12/22 Maroua	Aboukar Mahamat	ONG ACENN	National Coordinator
26/12/22 Maroua	Pr Kassoumna Liba'a	University of Maroua Department of Geography and meteorology	Head of the Department
Country: Central African Republic			
04/01/23 Bangui	Sembene Pierre	Direction Nationale des Pêches	Director
06/01/23 Bossangoua	Nguerom Etienne	Direction Régionale Eaux	Regional Director

06/01/23	Vopamade Passi Sendoka Simplicie Bonazouli Joel Nganatoua Prisca Dozon -Pende Philippe Namsona Odette Mbiti Marie Christine	Youth Association Reseau Oryx Direction Régionale Agriculture	President Director
Country: Niger			
11/01/23 Niamey	Laouali Ada	Prolac / Niger	National Coordinator
11/01/23 Niamey	Amadou Abdou	Prolac / Niger	Deputy National Coordinator
11/01/23 Niamey	Mahaman Chamsou	Prolac / Niger	Communication Officer
12/01/23 Niamey	Katiellou Gaptia Lawan	National Directorate of Meteorology	National Director Permanent Representative of Niger to WMO
17/01/23 Diffa	Daouda Baholé	Governorate of Diffa	General Secretariat
21/01/23 Diffa	Dalla Korodji	Regional Council/Diffa	President
18/01/23 Diffa	Mainassara Amadou	Prolac/Diffa	Social Development Specialist
18/01/23 Diffa	Mata Ibrahim	Prolac/Diffa	Agronomy Specialist
19/01/23 Diffa	Arma Alassane	Agriculture	Regional Director
19/01/23 Diffa	Lawan Haruna	Environment	Regional Director
19/01/23 Diffa	Boureima Halidou	Livestock Management	Regional Director
19/01/23 Diffa	Ms Adamou Mariam	DRAT	Officer
19/01/23 Diffa	Saidou Matto	Hydraulics Directorate	Officer
19/01/23 Diffa	Dr Issaharou Issiaka	University of Diffa	Teacher/Researcher
19/01/23 Diffa	Dr Hamet Bachir	University of Diffa	Teacher/Researcher
Country: Nigeria			
30/01/23 Abuja	Prof. Charles Anosike	Nigerian Meteorological Agency	Director Applied Meteorological Services
30/01/23 Abuja	Mercy Olojumoke Dike Odu	Federal Ministry of Water Resources	Head of Water Resources Planning Department
31/01/23 Kano	Mustafa Umar Mohamed	Jama'are River Basin Development Authority	Hydrologist
01/02/23 Hadejia	Muha Mustapha	Jama'are River Basin Development Authority	Head of Department

Cameroon

WMO CHH
World Hydrological Organization
Department of Hydrological Sciences

INTEGRATED WATER RESOURCES MANAGEMENT AND EARLY WARNING SYSTEM FOR CLIMATE CHANGE RESILIENCE IN THE LAKE CHAD BASIN

NO	ORGANIZATION	POST	DATE	NAME	PHONE	EMAIL
01	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
02	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
03	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
04	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
05	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
06	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
07	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
08	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
09	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
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13	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
14	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
15	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
16	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
17	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
18	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
19	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
20	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org

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01	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
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03	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
04	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
05	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
06	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
07	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
08	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
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14	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
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17	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
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19	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org
20	UNEP	Director	2013	Yves Fassin	237 90 00 00 00	y.fassin@unep.org

NAME	Address	Contact	Age	Sex	Signature
1. MARIAM BALLE	F	...
2.	F	...
3.	F	...
4.	F	...
5.	F	...
6.	F	...
7.	F	...
8.	F	...
9.	F	...
10.	F	...
11.	F	...
12.	F	...
13.	F	...
14.	F	...
15.	F	...
16.	F	...
17.	F	...
18.	F	...
19.	F	...
20.	F	...



Hydromet station Kousseri



Hydromet station housing Kousseri



Meeting with Méri's Community

Chad

WFP/CHAD
 Integrated Water Resources Management and Early Warning System for
 Climate Change Resilience in the Lake Chad Basin

NO	DESCRIPTION	PROJ	AMOUNT	UNIT	QTY	REMARKS
01	1.1.1.1.1.1.1.1	10100	10000000	USD	1	
02	1.1.1.1.1.1.1.2	10100	10000000	USD	1	
03	1.1.1.1.1.1.1.3	10100	10000000	USD	1	
04	1.1.1.1.1.1.1.4	10100	10000000	USD	1	
05	1.1.1.1.1.1.1.5	10100	10000000	USD	1	
06	1.1.1.1.1.1.1.6	10100	10000000	USD	1	
07	1.1.1.1.1.1.1.7	10100	10000000	USD	1	
08	1.1.1.1.1.1.1.8	10100	10000000	USD	1	
09	1.1.1.1.1.1.1.9	10100	10000000	USD	1	
10	1.1.1.1.1.1.1.10	10100	10000000	USD	1	
11	1.1.1.1.1.1.1.11	10100	10000000	USD	1	
12	1.1.1.1.1.1.1.12	10100	10000000	USD	1	
13	1.1.1.1.1.1.1.13	10100	10000000	USD	1	
14	1.1.1.1.1.1.1.14	10100	10000000	USD	1	
15	1.1.1.1.1.1.1.15	10100	10000000	USD	1	
16	1.1.1.1.1.1.1.16	10100	10000000	USD	1	
17	1.1.1.1.1.1.1.17	10100	10000000	USD	1	
18	1.1.1.1.1.1.1.18	10100	10000000	USD	1	
19	1.1.1.1.1.1.1.19	10100	10000000	USD	1	
20	1.1.1.1.1.1.1.20	10100	10000000	USD	1	

NO	DESCRIPTION	PROJ	AMOUNT	UNIT	QTY	REMARKS
01	1.1.1.1.1.1.1.1	10100	10000000	USD	1	
02	1.1.1.1.1.1.1.2	10100	10000000	USD	1	
03	1.1.1.1.1.1.1.3	10100	10000000	USD	1	
04	1.1.1.1.1.1.1.4	10100	10000000	USD	1	
05	1.1.1.1.1.1.1.5	10100	10000000	USD	1	
06	1.1.1.1.1.1.1.6	10100	10000000	USD	1	
07	1.1.1.1.1.1.1.7	10100	10000000	USD	1	
08	1.1.1.1.1.1.1.8	10100	10000000	USD	1	
09	1.1.1.1.1.1.1.9	10100	10000000	USD	1	
10	1.1.1.1.1.1.1.10	10100	10000000	USD	1	
11	1.1.1.1.1.1.1.11	10100	10000000	USD	1	
12	1.1.1.1.1.1.1.12	10100	10000000	USD	1	
13	1.1.1.1.1.1.1.13	10100	10000000	USD	1	
14	1.1.1.1.1.1.1.14	10100	10000000	USD	1	
15	1.1.1.1.1.1.1.15	10100	10000000	USD	1	
16	1.1.1.1.1.1.1.16	10100	10000000	USD	1	
17	1.1.1.1.1.1.1.17	10100	10000000	USD	1	
18	1.1.1.1.1.1.1.18	10100	10000000	USD	1	
19	1.1.1.1.1.1.1.19	10100	10000000	USD	1	
20	1.1.1.1.1.1.1.20	10100	10000000	USD	1	



Hydromet Station (CHAD)



Water level gauge



Meeting with NGO OHD officials (N'Djamena - CHAD)



Focus Group discussion with women's leaders in Bol

Niger

WHO CH-4
Water Resources Organization

INTEGRATED WATER RESOURCES MANAGEMENT AND EARLY WARNING SYSTEM FOR CLIMATE CHANGE RESILIENCE IN THE LAKE CHAD BASIN

ID	TRANSVERSE	TYPE	REQUIRE	AGE	DATE	REQUIRE
01	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
02	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
03	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
04	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
05	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
06	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
07	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
08	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
09	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
10	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
11	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
12	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
13	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
14	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
15	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
16	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
17	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
18	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
19	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
20	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010

ID	TRANSVERSE	TYPE	REQUIRE	AGE	DATE	REQUIRE
21	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
22	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
23	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
24	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
25	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
26	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
27	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
28	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
29	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
30	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010

ID	TRANSVERSE	TYPE	REQUIRE	AGE	DATE	REQUIRE
31	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
32	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
33	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
34	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
35	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
36	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
37	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
38	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
39	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
40	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010

ID	TRANSVERSE	TYPE	REQUIRE	AGE	DATE	REQUIRE
41	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
42	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
43	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
44	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
45	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
46	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
47	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
48	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
49	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010
50	WATER RESOURCES	WATER	WATER RESOURCES	2010	2010	2010



Persons with disabilities operating the Bossangoa site



Field exploited by people with disabilities in Bossangoa

ANNEX 4 – GENDER ASSESSMENT AND ACTION PLAN

The Environment and Social Policy (ESP) and Gender Policy of the Adaptation Fund (AF) require that all projects be screened against the 15 principles, including the Gender principle. This includes the identification of the conditions affecting gender responsiveness in the five countries of the Lake Chad Basin and how the proposed project activities address Gender inequalities.

This Annex therefore presents a detailed Gender Assessment (A4.1), which includes the literature review and the results of the consultative process with stakeholders in the field, as well as the assessment of Gender responsiveness of project activities. Based on these results, a Gender Action Plan (GAP) specific to relevant project activities has been developed (A4.2).

A4.1 GENDER ASSESSMENT

Purpose of this assessment

The purpose of this assessment is to identify key gender issues prompted by climate variability and change, in particular by hydromet hazardous events such as floods and droughts, as the main target impact of the project. This assessment includes an analysis of the gender disaggregated socio-economic and cultural data for the five countries of the Lake Chad Basin, in particular in relation to the climate-dependent sectors. It establishes a gender baseline, describing gender differences, analyzing gender-differentiated impacts and risks, and detailing opportunities to proactively address gender gaps influenced by intersectional socio-political factors, geared to promoting empowerment of women and girls as a key outcome of the project.

Methodology

The Gender Assessment provides the basis for the development of the Gender Action Plan (GAP) presented in A4.2 below. For the preparation of the Gender Assessment, the following methodology was applied:

- Literature review – a review of the literature about the project and its sector of activity was conducted before the field visits to the five countries concerned. The literature review focused on: (i) review of relevant documents of the project to get the understanding of the project activities and its scope; (ii) review the relevant national legislation relating to Gender issues and the Gender Policy of the Adaptation Fund that the project must conform with; (iii) review of other gender-related regional and global reports, in order to prepare a situational analysis of the relevant indices; and (iv) review of other relevant documents related to the project preparation. Information gathered at this stage was used to conduct the consultation process. The project concept note presented the geographical and hydroclimatic context of the project intervention area and gave a good idea of the natural resources exploited by populations. It also provided an initial overview of the gender issues in the Lake Chad Basin.
- Field missions and stakeholders consultations – the purpose of the field consultation was: (i) to understand and characterize potential gender-related impacts of the project; (ii) to generate a good understanding of the project by all stakeholders and identify gender-related actions; (iii) to understand people's expectations about the project; and (iv) to enable stakeholders involved in the project to provide their views and recommendations related to gender aspects. In addition, site-specific investigations were also conducted to gain insight into the likely impacts of the project on the environment. [Survey questionnaires](#) were used to gather information.

The Gender Assessment was made in conjunction with the Environment and Social Impact Assessment (ESIA), and involved meetings and exchanges with several stakeholders including: LCBC Focal Points; representatives from the ministries of water resources, environment, meteorology, managers of projects operating in the Basin; Research Institutes in the Basin (Universities of Maroua and Diffa); Civil Society Organization in the Basin (ACEEN in Maroua, Cameroun, ONG Karkara in Niger, OHD and several other Basin development partners. Field visits to communities depending on water resources and prone to climate variability and change events were also conducted.

Consultative process

Consultation is the process of gathering information or advice from stakeholders and taking their views into account when making project decisions and/or setting targets and defining strategies. From December 12, 2022 to February 3, 2023, two consultants hired by WMO conducted stakeholder consultations with government entities, universities, projects, communities, development partners and NGOs, to understand

their existing challenges and needs, collect their opinions and comments on the project, as well as suggestions and recommendations that could improve the environmental and social performance of the project.

Project activities have been designed and will be implemented with a special focus on Gender mainstreaming. Project activities were discussed with beneficiaries (including the most vulnerable groups – and taking into account the different needs and constraints of these groups). An extensive consultation process on environmental and social issues was carried out in Bol (Chad), Méri and Kousseri (Cameroon), Bossangoa (Central African Republic), Diffa (Niger) and Hadejia (Nigeria). It should be mentioned that these are not necessarily the sites to be used in the proposed project implementation; the rationale for their selection is provided in Annex 3. These visits allowed broad consultations with the local populations, the technical services, the administrative and traditional authorities. In summary, during the field consultation process, 192 people were people met, of which 46% are women (see **Annex 3**, Table A3.1.1 for detailed information). List of stakeholders consulted, and field mission pictures are provided at the end of Annex 3.

Differentiated Climate Change Impacts on Gender

The impacts of climate change affect men and women differently as their roles differ in the society. It has been observed that climate change could increase existing gender inequalities by aggravating the vulnerability and adaptability of women to face climate change impacts (WEDO, 2007). It is often the burden of women to take charge of acquiring water and fuel for cooking and subsistence in rural areas. In times of drought, stress on water supplies increase the time women spent on this task, therefore limiting their availability to participate in educational opportunities or income-generating activities (WEDO, 2007). The dependency of women on natural resources such as water or firewood makes them more vulnerable to climate change. This is also true in the Lake Chad Basin where a study showed that an increase in pests and disease linked to climate change led to an augmentation of the women workload in Nigeria (WEDO, 2011). Drought and desertification, which lead to resource scarcity, are also amplified by climate change and disproportionately affect women. When faced to climate extremes such as floods and droughts, factors such as social exclusion, lack of equal access to resources and lack of mobility disproportionately affect women (Neumayer and Pluemper, 2007).

In the Lake Chad Basin, climate projections predict that weather patterns will become more extreme and unpredictable. It will result in an increase in variability of the amount and timing of rainfall (Janani et al., 2019). In this region, temperatures are rising one and a half times faster than the global average (Janani et al., 2019). Rising temperatures lengthen drought seasons leading to the depletion of water resources that become insufficient for family and agricultural production. This decrease in accessible resources increases the number of tasks performed by women and girls or makes these tasks more time-consuming, such as the search for water and firewood. In such a context, the time available for income-generating activities, education and participation in community decision-making is becoming increasingly scarce.

Gender in agriculture is marked by numerous disparities. In the Sahel, women provide 80% of the agricultural labor force and play an essential role in household nutrition, yet they have less access than men to the factors of production (land, water, inputs, equipment, digital tools, training, information, credit and access to the market and capacity building activities, etc.) (Alliance Sahel, 2021). Gender roles are clearly and rigidly defined. As stated in a study prepared in the context of the PRESIBALT project, in the Lake Chad Basin, while the men usually control the capital such as the fields for agriculture or livestock for breeding, women and children are in charge of the processing and marketing of the products such as, for example, milk processing and marketing or smoking of small quantities of fish. In addition, their access to land is limited and precarious: they rarely own the land and are often assigned to cultivate poor quality land such as women active in irrigated agriculture. This is often the consequence of the social and cultural norms established by the communities.

While women have specialized knowledge on ecosystems that they work within, they face historic and cultural disadvantages which restrict their access to information, their participation in disaster preparedness and decision-making power (WEDO, 2017). Much of the information coming from global climate change research has not been presented in a way that affected communities can easily understand, thus further limiting the potential for genuine participation. For these reasons, often the capacity to adapt to and mitigate the impacts of climate change is lower for women than those of men.

Gender disaggregated socio-economic and cultural data for the five countries of the Lake Chad Basin

As stated in a study prepared in the context of the PRESIBALT project, the Lake Chad Basin is characterized by strong gender inequalities, exacerbated by climate change and insecurity that push women and the remaining community members into a cycle of vulnerability.

According to the Africa 2030 Report (JICA, 2017), whilst primary and secondary girl enrolment have improved substantially, there are still major impediments for women in the West and Central Africa regions in terms of

Field Code Changed

access to equal education and economic opportunities. This is particularly the case of Nigeria, wherein the percentage of women in the national assembly is still at 4%, and very little has increased from 3% in 2000 (WB, 2023); on the opposite, Cameroon, Chad and Niger show the highest increase in the percentage of women in the national assemblies (Table A4.1.1).

Table A4.1.1. Percentage of women in the National Assembly (WB, 2023).

	Cameroon	CAR	Chad	Niger	Nigeria
1997	6	4	2	1	-
2000	6	7	2	1	3
2021	34	13	32	26	4

Table A4.1.2 provides the scores (i.e. values and ranks) for various gender related indices for the five countries. In particular, the Gender Development Index (GDI) varies between 0.770 (rank #190 of 191) for Chad to 0.885 (rank #151 of 191) for Cameroon (UNDP, 2023a) and Gender Inequality Index (GII) (UNDP, 2023b) from 0.565 (rank #151 of 191) for Cameroon to 0.552 (rank #190 of 191) for Chad. It is worth to note that the lower GII values represent a better performance regarding gender inequality. So, in brief, gender inequalities are still common, especially in rural areas in Central African Republic (CAR), Chad and Niger. Women face limited access to land resources, extension programs, financial credit, and job training; women generally have longer work hours, and a large share of all unpaid work; and women are underrepresented in decision-making positions and in government, including local government. Even though numerous laws and policies have been passed to advance gender equality and women's rights in these countries, the representation of women in positions of power and decision-making within public and private bodies and representative institutions at national and local levels and within political parties remains low.

Table A4.1.2. Scores (values and ranks) for various gender related indices for the five countries (UNDP, 2023a; UNDP, 2023b and WEF, 2022).

Index	Cameroon		CAR		Chad		Niger		Nigeria	
Gender Development Index (GDI)	0.885	151/191	0.81	188/191	0.77	190/191	0.835	189/191	0.863	163/191
Gender Inequality Index (GII)	0.565	151/191	0.672	188/191	0.552	190/191	0.611	189/191	0.68	163/191
Global Gender Gap Index (GGGI) of the World Economic Forum	0.692	97/146	-	-	0.579	142/146	0.635	128/146	0.639	123/146
GGGI sub-index 'political empowerment'	0.202	76/146	-	-	0.202	74/146	0.155	96/146	0.04	141/146
GGGI sub-index 'educational attainment'	0.887	129/146	-	-	0.603	145/146	0.75	141/146	0.826	134/146
GGGI sub-index 'health and survival'	0.973	60/146	-	-	0.97	79/146	0.964	115/146	0.967	97/146
GGGI sub-index 'economic participation and opportunities'	0.704	66/146	-	-	0.539	124/146	0.672	82/146	0.724	50/146
Multidimensional Poverty Index (MPI)	0.43	35/111	-	-	0.842	29/111	0.91	1/111	0.464	25/111

The Global Gender Gap Index (GGGI) of the World Economic Forum (WEF, 2022) varies between 0.579 (rank #142 of 146) for Chad to 0.692 (rank #97 of 146) for Cameroon. There is no information available for CAR in relation to the GGGI. The scores are much higher in sub-indices for 'health and survival' and for 'economic participation and opportunities'; but much lower in sub-index for 'educational attainment' (Table A4.1.2). While some progress on women's rights has been achieved, much work still needs to be done in these countries to achieve gender equality.

The Governments of the five countries are committed to addressing gender inequality in all aspects of women's lives (Table A4.1.3). Gender is integrated into National Gender Policies and Strategies. These policies and strategies provide a legitimate point of reference for addressing gender inequalities at all levels of government and by all stakeholders. While still limited, it is expected that these efforts will bring positive impacts in the near future, such as increasing awareness on gender as a development concern, increasing

enrolment and retention of girls in schools, improving health care delivery, increasing women participation in decision-making, and reduction in gender stereotyping and discrimination.

Table A4.1.3. Relevant international, regional and national frameworks, policies, plans and programs on gender equality.

Countries	International and Regional	National
Cameroon	<ul style="list-style-type: none"> International Convention on Economic, Social and Cultural Rights International Covenant on Civil and Political Rights Amendment to article 20, paragraph 1 of the Convention on the Elimination of All Forms of Discrimination against Women Optional Protocol to the Convention on the Elimination of All Forms of Discrimination against Women Convention on the Rights of the Child Convention on the Rights of Persons with Disabilities Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women African Charter on Human and Peoples' Rights Protocol to the African Charter on Human and Peoples' Rights on the Rights of Persons with Disabilities in Africa African Union Convention for the Protection and Assistance of Internally Displaced Persons in Africa (Kampala Convention) 	<ul style="list-style-type: none"> National Gender Policy Law 2012/001 of 19 April 2012 on the electoral code Decree N° 74-01 of July 6, 1974, on equal land access Decree n° 76/165 of 27 April 1976 fixing the conditions for obtaining a land title, modified and completed by decree n°2005/481 of 16 December 2005
Chad	<ul style="list-style-type: none"> Discrimination against women Optional Protocol to the Convention on the Elimination of All Forms of Discrimination against Women Convention on the Rights of Persons with Disabilities African Charter on Human and Peoples' Rights Protocol to the 'African Charter on Human and Peoples' Rights' on the Rights of Women Protocol to the 'African Charter on Human and Peoples' Rights on the Rights' of Persons with Disabilities in Africa 	<ul style="list-style-type: none"> The National Gender Policy (PNG) adopted and promulgated in 2017 (Decree N°2035/PR/PM/MFPPESEN/2017), with the five-year gender action plan, 2019-2023 Constitutional provisions: articles recognizing violence against women and girls Legal and regulatory provisions: Article 5 of Law No. 17/PR/2001 on the status of the civil service on equal access to the civil service promotes gender equity Law N°29/PR/2015 prohibiting child marriage Law No. 001/PR/2017 on the penal code, which punishes violence (Articles 339 to 346), specifically Article 369 that punishes the refusal to enroll a daughter in school or her dismissal because of pregnancy
Central Africa	<ul style="list-style-type: none"> Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) adopted on December 18, 1979 and entered into force on September 3, 1981 Protocol to the CEDAW (adopted on October 6, 1991 and entered into force on December 22, 2002) ROME STATUTE (adopted in Rome on July 17, 1998 and entered into force on July 1, 2002) MAPUTO PROTOCOL (adopted in Maputo on July 1, 2003 and entered into force on November 25, 2005) African Charter on the Rights and Welfare of the child (adopted July 1, 1990 and entered into force November 29, 1999) Protocol on the Establishment of an African Court on Human and Peoples' Rights was adopted on March 4, 2002 Convention on the Rights of Persons with Disabilities of 13 December 2006 The Universal Declaration of Human Rights of December 10, 1948 The International Covenant on Civil and Political Rights of December 16, 1966 The International Covenant on Economic, Social and Cultural Rights of 16 December 2016 The Convention on the Elimination of All Forms of Discrimination against Women of 18 December 1979 	<ul style="list-style-type: none"> National Gender Policy Law on the organisation and functioning of the Said Court adopted on December 19, 2005 The Constitution of the Central African Republic of December 27, 2004 reaffirms and guarantees equality between men and women Law n°16.004 instituting parity between men and women in the Central African Republic Law N°09.004 of January 29, 2009 on the Labor Code of the Central African Republic. This law makes significant progress in the area of gender, namely the protection of the work of women, children and the elderly Law N°99.016 of July 16, 1999, on the General Statute of the Civil Service Law N°10.001 of January 6, 2010 on the Central African Penal Code has made provisions to specifically protect women, children and particularly vulnerable persons in Title III, chapters V and VII. A quota of 35% of women is required, based on their skills, in decision-making bodies of a nominative and elective nature, both in state and private structures

	<ul style="list-style-type: none"> • The Optional Protocol to the Convention on the Elimination of All Forms of Discrimination against Women of October 6, 1999 • The Convention for the Suppression of the Traffic in Persons and of the Exploitation of the Prostitution of Others of 2 December 1949 • The Convention on Consent to Marriage, Minimum Age for Marriage and Registration of Marriages of 7 November 1962 	
Niger	<ul style="list-style-type: none"> • African Charter on the Rights and Welfare of the Child (ACRWC) • African Charter on Human and People's Rights (ACHPR) • Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) • Optional Protocol to the Convention on the Elimination of All Forms of Discrimination against Women • African Charter on Human and Peoples' Rights • Protocol to the 'African Charter on Human and Peoples' Rights' on the Rights of Women • Protocol to the 'African Charter on Human and Peoples' Rights' on the Rights of Persons with Disabilities in Africa 	<ul style="list-style-type: none"> • Constitution of Niger on articles 10,12,13,14 • National Gender Policy • The implementation of the Economic and Social Development Plan (ESDP), more inclusive marks a significant change in the orientation of public policies
Nigeria	<ul style="list-style-type: none"> • Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) 1981 • Maputo Protocol on the Rights of Women in Africa 2004 • Convention on the Rights of Persons with Disabilities • Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women • Protocol to the African Charter on Human and Peoples' Rights on the Rights of Persons with Disabilities in Africa 	<ul style="list-style-type: none"> • National Institutions with Mandates Related to Gender and or Environment • National Gender Policy • Promoting the empowerment of women and integrating gender within key sectors as highlighted within the Agriculture/Rural Development; Environment/Natural Resource; Women's political participation and engendered governance including gender and conflict management

Table A4.1.4. provides an assessment of the socioeconomic aspects in the five countries, including demographic information, health, education, labor market, income, poverty, gender violence, political participation, climate change impact (including access to information, vulnerability and adaptation), and access to resources (e.g. land).

Table A4.1.4. Assessment of the socioeconomic aspects in the five countries.

Cameroon			
Socioeconomic aspect	Assessment (short description)	Women	Men
Demographic information	According to (INS, 2019), the profile of the Cameroonian population highlights important demographic issues; population growth is still very high. The Cameroonian population is estimated on July 1, 2019 at 24,348,251 people, of which 50.6% are women and 49.4 are men. The population of Cameroon is characterized by its extreme youth. This juvenilizing of the population can be seen in the median age and the average age, estimated at 17.7 and 22.1 years, respectively.	50.6%	49.4%
Health	Life span is one of the most important demographic and health indicators. It shows the average number of years of a person's future life. That is, the future life of a person can remain theoretically unchanged provided that the current fertility and mortality rates remain unchanged throughout life. The average life expectancy at birth (both sexes) in Cameroon is 54.4 years. This is below the average life expectancy in the world, which is about 71 years (according to the Population Division of the United Nations Department of Economic and Social Affairs: 2022). Thus, according to the same source, the average life expectancy of men at birth is - 53.5 years and the average life expectancy of women at birth - 55.3 years. In Cameroon, the adult mortality rate is 4.81 deaths per 1,000 individuals among men and 4.18 deaths per 1,000 individuals among women. The mortality rate for both women and men increases overall with age. For women, rates increase fairly rapidly from age 15-19 to 30-34, then level off at age 35-39, followed by an increase to a maximum rate of 6.9 at age 45-49. For men, the variations are more irregular. Compared to women, men's mortality rates are found to be higher after age 40 (10.1 ‰ at 40-44 years and 9.8 ‰) (DHS 2018, Cameroon). Maternal deaths account for 45% of all deaths of women aged 15-49. The percentage of female deaths that are "maternal" varies from a low of 15% among women aged 45-49 to a high of 55% at ages 25-29. In the Far North region of Cameroon, for example, 37 percent of children are stunted. This prevalence of stunting decreases as the level of household economic well-being increases, from 40% for children in the lowest quintile households to 9% for those in the highest quintile households (UNDP, 2016; World Bank, 2018; NSI and ICF International, 2018).	-55.3-year-old	-53.5-year-old
Education	According to the Central Bureau of Census and Population Studies (BUCREP) report on the 2022 edition of World Population Day, this rate is 6.15% higher among boys in 2018/2019. The enrollment of secondary school students has experienced a decline between 2015 and 2019 in Cameroon. This is revealed by the report of the Central Bureau of Census and Population Studies (BUCREP) on the World Population Day 2022 edition, reached the editorial office of Data Cameroon. According to the study, the gross and net enrollment rates of boys are higher than those of girls, whatever the school year. Moreover, during the 2018/2019 period, the gross enrollment rate for boys was 48.60%, against 42.45% for girls. And still during this year, boys had a net enrollment rate of 37.20% and girls 33.46%. In Cameroon, 32.5% women over 25 years old have achieved some level of secondary education compared to 39.2% of men. Boys have privileged access to education, their gross enrolment rate is 125% at primary level (110% for girls) and 65% of them are enrolled in secondary school (53% for girls) (Brun, D.2019). The Statistic yearbook for the Ministry of Higher Education 2012 in Cameroon reported that 32.3% of young women follow scientific field in education. While girls' access to education has increased, it remains limited by sociocultural considerations about girls' education, particularly in the northern part of the country (MINPROFF, 2012). In 2015, the primary school enrollment rate for girls was 86 percent and for boys 97 percent. At the secondary and higher levels, the proportion of girls enrolled remains low compared to boys, 37% versus 43% in secondary school and 10% versus 14% in higher education. The latest Cameroon Demographic and Health Survey (DHS, 2018) reveals that women complete 4.7 years and men 5.4 years of education throughout their lives. Literacy is measured by the overall literacy rate (OLR) of people aged 15 and over. The overall GRL for women over 14 is 64.2%, which is still far from the goal of universal female literacy in Cameroon. The lowest proportions of literate women are found in the North and East regions of the country. The gaps in relation to the national average are all negative and significant.	33.46%	37.2%

Labor market	<p>In Cameroon, the labor force participation rate among females is 70.2% and among males is 80.7% for 2021. The labor force participation rate is the proportion of the population ages 15 and older that is economically active. Since 1990, female labor force participation has decreased. Compared with labor force participation in the lower-middle income group, the gap between men and women is lower in Cameroon. Women make up 71.6% of workers in the informal agricultural sector (OCHA, 2019).</p> <p>According to the UNWOMEN report 2018 on Cameroon, 79.2% of women are underemployed. Women face a lack of enabling and ideal conditions for equal and equitable access to credit for men and women. Indeed, 67% of women traders reported a lack of equity and credit (RESTE/Trust Fund, 2018).</p>	70.2%	80.7%
Income	<p>Despite a growing number of legal initiatives in Cameroon, discrimination against women remains a concern, especially in access to credit. Overall, nearly 47% of women have poor access to credit. This observation of inequality in terms of women's access to credit is more recognized among men than among women. In terms of financial inclusion, gender gaps exist. In Cameroon, only 5% of women have a bank account compared to 12% of men (FAO, 2018). Women spend an average of 8.2 hours more per week than men on unpaid household tasks 16.8% of women benefit of a credit for any use (OCHA, 2019).</p> <p>Vulnerable employment among women is 80.8% and among men is 62.9% in Cameroon for 2019. The rate of vulnerable employment is lower for men but similar for women in Cameroon compared to the average rate in Sub-Saharan Africa.</p>	80.8%	62.9%
Poverty	<p>While 39% of the national population lives below the poverty line, this rate rises to 51.5% for women (OCHA,2019). According to the fourth Cameroonian household survey (ECAM IV), the proportion of the population living below the poverty line at the national level fell from 40.2 percent in 2001 to 37.5 percent in 2014, recording a decline of 2.7 percentage points over the period. The level of poverty recorded in 2007, however, masks spatial disparities. Rural areas accounted for nearly 90% of the poor in 2007. The Far North (65.9%), North (63.7%), Adamaoua (52.9%), North-West (51%), East (50.4%) and Center (41.2%) regions are those where the incidence of poverty is above the national average (39.9%). Moreover, the results of ECAM III underline that poverty affects households headed by widows much more. Indeed, three out of five (60%) widowed women live in poor households.</p>	51.5%	48.5%
Gender Violence	<p>The statistics on women and gender-based violence in Cameroon are disturbing. In Cameroon, 43.2% of women in union are confronted with conjugal violence. Emotional and sexual violence affect 39.8% and 14.5% of women respectively. Nationally, 20.1% of women have been forced to have sex for the first time. Since the age of 15, more than half of women in Cameroon (53%) have experienced physical violence, and in 45% of cases, women have experienced such violence in the past 12 months (Brun, 2020).</p> <p>According to the statistical yearbook of the last elections, for example, 61 of the 180 members of parliament are women. Only 37 women are mayors out of the 365 municipalities in the country. There are only 11 women among the 70 ministers and similar positions. Finally, in the university sector, women represent only 23% of assistants, 19% of lecturers, 8% of professors and 6% of full professors. In reality, women are little or not represented in the spheres of society and worse, they are often marginalized.</p>	43.21%	4.0%
Political participation	<p>In Cameroon there is a low representation of women in the political field. Germaine Bienvenue Noukio (2020) noted that women and girls represent 52% of the population of Cameroon, yet they occupy less than 8 percent of the country's political and decision-making system. Thus, Cameroon is one of the countries where women are not motivated to contribute in the political arena; rather, they are unfortunately seen as mothers whose main role is to cook and take care of the children.</p> <p>In Cameroon, as part of the implementation of the National Gender Policy, gender focal points have been appointed in sectoral ministries and gender committees have been created in some ministries. Gender mainstreaming guides for development policies, plans and strategies have also been developed. These tools have enabled gender to be considered effectively in priority action plans, programs and development strategies.</p> <p>The first results are being felt with the improvement of parity between men and women in certain institutions. For example, the proportion of women deputies in the National Assembly of Cameroon has increased from 3.3% in the 2007-2012 legislature to 17.2% in the 2013-2018 legislature. The proportion of women ministers or assimilated in Cameroon rose from 14.2% in the December 2011 government to 17.2% in the March 2018 government.</p> <p>Another barrier to gender equality is male-dominated decision-making. For example, men often decide where and how water infrastructure will be built, while women are the primary users of water. Despite the fact that women are the numerical majority of the youth and adult population in Cameroon, they are largely excluded from decision-making in the water and climate sectors at the community, local and national levels. (Bienvenue Noukio, 2020)</p>	17.2%	82.8%

Climate change impact (access to information, vulnerability, adaptation)	Climate change and its negative effects have rendered farm incomes less reliable than ever before. Women in agriculture are vulnerable to negative effects of climate change. For this reason, more farmers, especially women seek off-farm sources of incomes. In most cases they resort to petty businesses. The easiest way they find to get into this is to borrow money, although they equally borrow for other coping strategies such as meeting pressing family needs (NEPAD, 2012). However, only 16.8% have access to credit and 51.5% of women live below the poverty line. (ONUFEMMES Rapport Cameroun, 2018). Access to climate information is predicted to be low as 50% of women (14-49 years old) are not exposed to any media at least once a week compared to 46% of men. (Cameroon gender profile 2021, p.37).	80.0%	52.0%
Access to resources (e.g. land)	Women's use, possession and control of household resources is all the weaker the more valuable the property is, whether social (prestige) or economic even these days. Thus, only 3% of women own a house without a land title and 1.6% own a land title in their name. Women have access to plots of land that are not owned by them. However, this access to land does not allow them to control it, as they do not have the land inherited from their parents and husbands. Women's access to land is crucial in the fight against hunger and poverty. This same survey also revealed that 3.8% of women who own land reside in the Adamaoua region compared to 9.2% in the South region. (LandCam,2021)	17.1%	21.5%
CAR			
Socioeconomic aspect	Assessment (short description)	Women	Men
Demographic information	In Central African Republic, the female population accounted for 50.4% of the total population (World Bank, 2020). Only 69.2% of girls were enrolled in school compared to 98.3% of boys, an approximate 30% differential rate, in 2011 (PRESIBALT, 2020).	50.4%	49.6%
Health	In the economic sphere, there is a real imbalance against women. Of the 80% of the rural population, women make up 87% of the rural workforce. In terms of health, several indicators have deteriorated, in particular the infant mortality rate, the maternal mortality rate and the rate of assisted childbirth. Life span is one of the most important demographic and health indicators. It shows the average number of years of a person's future life. That is, the future life of a person can remain theoretically unchanged provided that the current fertility and mortality rates remain unchanged throughout life. The average life expectancy at birth (both sexes) in CAR is 50.1 years. This is below the average life expectancy in the world, which is approximately 71 years (according to the United Nations Department of Economic and Social Affairs Population Division: 2022). Thus, according to this source, the average life expectancy of men at birth is - 48.8 years and the average life expectancy of women at birth - 51.4 years. With regard to access to basic social services, the rate of access to drinking water is estimated at less than 30%, with 31.8% in urban areas and 27.6% in rural areas. 31.8% in urban areas and 27.6% in rural areas. In the city of Bangui, the rate is 36.5% and 27% in rural areas. The national coverage rate for basic sanitation service remains below 30% in 2018. This situation has consequences on the time budget of women and girls whose social roles attribute to them the provision of water in households (PNUD, GENDER PROFILE OF THE RCA 2021).	-51.4 year old	-48.8-year-old
Education	At the level of education, between 2012 and 2018, there has been a considerable improvement in the GER in primary school, from 87.81% in 2012 to 116% in 2018. Unfortunately, this improvement in the Gross Enrollment Rate has not translated into a reduction in the enrollment gap between girls and boys. This gap, which was 24.1% in 2012, rose to 26% in 2018, indicating a relative stagnation in the period, despite the observed increase in girls' enrollment in primary education. In secondary education, in addition to the low secondary education, in addition to the low participation of girls compared to boys, there is a trend towards dropping out of school over the period 2012-2016, where the GER fell from 17.39% in 2012 to 15.04% in 2016. The decline in secondary school enrollment among adolescents is a clear indication of the effects of war and insecurity on this age group (PNUD, GENDER PROFILE OF THE RCA 2021).	58.0%	33.0%
Labor market	Unemployment affected women (42.1%) more than men (28.6%). Globally, some progress on women's rights has been achieved. However, work still needs to be done in the Central African Republic to achieve gender equality. As of December 2020, only 27.8% of indicators needed to monitor the SDGs from a gender perspective were available, with gaps in key areas, in particular: unpaid care and domestic work, key labor market indicators, such as the unemployment rate and gender pay gaps and information and communications technology skills. (ONUFEMMES, 2021).	64.4%	79.8%
Income	The agricultural sector employs 80% of the households in CAR (PRESIBALT, 2020). More than 60% of household heads are farmers. 80% of food production is carried out by rural women and represents more than 65% of agricultural production. In other terms, 61.55% of women have very low income for 48.8% for men. In terms of employment, few women are salaried and the majority of them are destitute. (Gender profile CAR 2021).	61.6%	48.8%

Poverty	The disparity between urban (73.8 percent) and rural (26.6 percent) areas is very high. This proportion is 25% among poor women compared to 77% for women belonging to the wealthy groups. According to EESI 2 (INS, 2010), the rural sector is mainly driven by women, who represent 71.6% of the informal agricultural sector. Women are generally confined to vulnerable jobs: more than eight out of ten jobs held by women are vulnerable. Most women are self-employed or employed in family businesses without pay. Few are able to hire employees. The informal agricultural sector is dominated by women, 57.9% of whom are engaged in informal agricultural activities. Moreover, 58.1% of women work in the primary sector. Thus, very few of them can expect to earn a salary from their economic activity. Women who receive a salary from their activity represent only 12.3% compared to 27.2% for men (BUCREP, 2011). With regard to overall underemployment, women are more affected than men: 78.8% for women compared to 60.2% for men. This economic vulnerability of women is more pronounced among women in union than among women who have broken their union.	81.0%	69.0%
Gender Violence	Gender-based violence (GBV) has recently taken on a worrying dimension in the Central African Republic (CAR), especially following the crisis that the country has been experiencing for several years. This situation is also reinforced by socio-cultural norms that are unfavorable to women and girls, despite the existence of policies and normative texts on the subject. Violence against civilians and insecurity, particularly in areas outside urban centers, continue to increase the vulnerability of millions of people, especially women, who see their livelihoods eroded and their access to food and basic services such as health care and water drastically limited. By 2023, the number of people in need of humanitarian assistance and protection will increase by 10%, reaching 3.4 million people, or 56% of the population. Among them, 2 million people have needs so complex and severe that their physical and mental well-being is threatened (OCHA, 2023). While IDPs and refugees are often the most visible face of the crisis in CAR, GBV has taken on a disturbing scale. Every hour that passes in CAR, three people are subjected to GBV, including sexual violence. According to the statistics of the GBVIMS, 17,831 cases of GBV were recorded between January and September 2022, an increase of 53% compared to the total number of cases recorded in 2021. Just over one-third of the recorded GBV were sexual violence, while a large majority (95%) of survivors are women and girls. The ever-increasing stress within households due to the food insecurity that severely affects the country, as well as the adoption of negative coping mechanisms (early marriage of girls, sex to access food) continue to lead to an increase in GBV that affects thousands of women and girls. Among the 10 sub-prefectures that have recorded an increase in GBV cases, five are classified in phase 4 of food insecurity, which is one step away from a catastrophic situation (OCHA, 2022).	95.0%	5.0%
Political participation	Gender and participation in public decision-making bodies the current government has only 5 women ministers out of 39. In the regions, 12% of prefectures are headed by women (2 women out of 16); 11.3% of sub-prefectures are headed by women (8 women out of 63), a quota that is still far from the minimum of 35% provided for in the Law on Parity (UN Women, 2021). Although they represent 50.2% of the population, Central African women are not very visible on the political scene and in appointed positions. As a result, their presence in elective positions in parliament or local government remains very low. In the National Assembly, they represent only 8.57% (12 out of 140) of parliamentarians. This observation can also be made at the level of local authorities, where only 10% (20 out of 179) of mayors' posts in communes are held by women. However, there are 15 women out of 49 among the members appointed to head the National Elections Authority (ANE), representing 30% of the total, which is close to 35% (ONUFEMMES,2021).	14.4%	85.6%
Climate change impact (access to information, vulnerability, adaptation)	Central African women are impacted by climate change more than men because at the time of disasters men may experience rural exodus and abandon their wives, daughters and children to seek employment elsewhere without any means of support for their families. Other difficulties for women are the impact of climate change on biodiversity with the shrinking of the forest cover. Rural women have to walk for several hours in search of virgin forest to gather forest products for their subsistence and that of their families (Gender profile CAR 2021). In the hinterland during the dry season when water sources dry up, girls are forced to go and collect water far from their homes, often exposed to aggression by men, and often drop out of school along the way. (Gender profile CAR 2021). The majority of women in CAR, who make their living from the exploitation, transformation and commercialization of natural resources, are the first victims of climate change. However, the vulnerability of Central African women to climate change is also compelling and can be mitigated if they are directly involved or associated in decision making as men are, despite their social status which finds them too fragile and severely affected by climate change, they are responsible for food production, water supply and domestic energy. The active participation of women in environmental decision making, especially at the management, design, planning and implementation levels of projects is very	80.0%	20.0%

	important, but so far this participation remains low. (Central African Republic Proposal for Submission A.4 - Decision /CP26 paragraph 9 for the month of March 2022)		
Access to resources (e.g. land)	Households whose heads work in agriculture are among the poorest, as these households, which have an average size of 8 to 10 persons and are headed by women (21.8%), represent more than 60% of the population. Cash crops (coffee, cotton, etc.) are mainly produced by men, while women farmers mainly produce food crops (cassava, groundnuts, maize, millet and sorghum, etc.) on plots of land allocated by men. With regard to the division of tasks between men and women in the field, men are primarily responsible for preparing the plantation (clearing, stumping, ploughing and weeding). Sowing, harvesting and post-harvest work are specifically assigned to women (Gender profile CAR 2021). Livestock farming is practiced by more than 80% of the rural population, but small-scale traditional livestock farming predominates. Poultry farming is present on 67% of farms, and pig farming on 74%. The animals are generally owned by men (large livestock, small ruminants, guinea pigs), while poultry is generally owned by women (Gender profile CAR 2021). Fishing in CAR is traditional and artisanal and is carried out by families who are traditionally fishermen. The men are responsible for catching the fish, while the women are responsible for processing the fish products by drying or smoking, and selling them on local markets, either fresh or processed. (Gender profile CAR 2021) While many urban women still face financial, legal, or technical barriers to land ownership, others are held back by traditional and religious barriers (illiteracy, insufficient technical knowledge, oppressive gender relations, patriarchal views, social taboos, and family responsibilities) to asserting their absolute rights, and this discrimination under customary law contributes to the feminization of misery in rural areas (Gender profile CAR 2021).	17.8%	82.2%
Chad			
Socioeconomic aspect	Assessment (short description)	Women	Men
Demographic information	The evolution of demographic indicators shows that Chad's population, which was 11.1 million in 2009 (density 8.6 inhabitants per km ²), reached 12.3 million in 2012 and is expected to rise to 13.7 million in 2015 (the year in which the MDGs will be assessed) and to reach 15.1 million in 2018. According to the final results of the RGP2, women and young people under 15 years of age remain in the majority with a proportion of 50.6%, and the average annual intercensal growth rate is estimated at 3.6% (including refugees). The average household size is 5.3 and the sex ratio is estimated at 97.6%. The urbanization rate remains low at 21.9%. The average age of the population is 19.7 years, while the median age is 14.8 years. The percentage of women aged 15-49 increases from 43% in 2009 (22% of the total population) to 48% (24% of the total population) by 2050 (INSEED, 2014). Chad's population is predominantly made up of children and youth. The results of the second population census show that people aged 0-24 years represent more than two-thirds of the total population (68%). Overall, the 0-14-year-old population represents 55% of the total population, the 15-64-year-old population represents 42%, and only 3% of the population is 65 years and older. This age structure gives the distribution of the population by gender as follows: 57% of males against 54% of females aged 0-14 years, males aged 15-64 years represent 40% against 44% of females and males aged 65 years and above represent only 3% of the total male population against 2% of females (INSEED, 2014) Regional instability puts Chad in a difficult socio-economic and humanitarian situation. The country hosts hundreds of thousands of refugees (about 550,000 in 2015) from the Central African Republic, Sudan (Darfur), Nigeria and Niger, and is threatened by the terrorist acts of the Islamist sect Boko Haram in northern Nigeria and Cameroon. The current population of Chad is roughly 11 million inhabitants. Population density is generally very low, with nearly half (47%) of the country's inhabitants residing on 10% of the land and the majority (76% of women and 70% of men) living in rural areas (Boyer et al., 2016).	50.6%	49.4%
Health	In Chad, 40% of children are stunted and chronically malnourished: 18% in the moderate form and 22% in the severe form. Nearly one in eight children (13%) is acutely malnourished, 9% moderately and 4% severely. Twenty-nine percent of children under five are underweight: 18 percent in the moderate form and 11 percent in the severe form (INSEED and ICF International, 2014, World Bank, 2018). Life span is one of the most important demographic and health indicators. It shows the average number of years of a person's future life. That is, the future life of a person can remain theoretically unchanged provided that the current fertility and mortality rates remain unchanged throughout life. The average life expectancy at birth (both sexes) in CAR is 48.3 years. This is below the average life expectancy in the world, which is approximately 71 years (according to the United Nations Department of Economic and Social Affairs Population Division: 2022). Thus, according to this source,	-49.4 year old	47.3 year old

	the average life expectancy of men at birth is - 47.3 years and the average life expectancy of women at birth - 49.4 years.		
Education	<p>Despite these crises, the government has made significant efforts to promote gender in the socio-economic and socio-political sectors. For example, in the education sector, the Technical Unit for the Promotion of Girls' Education was transformed into a Directorate for the Promotion of Girls' Education in 2007. Under this direction, the Ministry of National Education (MEN) organizes awareness and advocacy campaigns for the promotion of girls' schooling. The encouragement of girls in scientific fields is done through prizes and scholarships for excellence (UNESCO,2022). According to UNESCO (2016), the literacy rate for women is 14% while it is 31% for men despite the fact that secondary education is free in the same way as elementary school. Between 2008 and 2015, the gross enrollment rate for girls increased from 80% to 82.70% while the completion rate increased from 27% to 32% between 2014 and 2015. Over the course of her lifetime, a Chadian woman will receive the equivalent of only 2.4 years of quality education compared to 3 years for a man (Alliance Sahel, 2022).</p> <p>The Government of Chad has made considerable progress with the schooling of young girls. This has helped improve gender parity in relation to primary education, with the proportion rising from 61% in 2000 to 70% in 2010 (CBLT, 2016).</p> <p>In 1996, 56 percent of men and 78 percent of women had never received an education. According to the 1994 DHS report, one in five or 19 percent of women had received primary education, while only 2 percent had attained secondary school or higher. In the second DHS of 2004, the proportion of women and men who had never attended school declined. The proportion of women with a primary education increased over the generations: from 10 percent among women aged 45-49 to 26 percent among those aged 15-19. In rural areas, only 19% of women have attained at least primary education, compared to 48% in urban areas. (INSEED, 2014).</p> <p>The proportions of illiterate women and men remain high (88% and 65%, respectively), and the proportion of literate men is about three times higher than that of women (35% versus 12%). Moreover, the school attendance rate for boys is 57% for the 6 to 15 age groups, compared with only 38% for girls. In the field of education, 78% of women against 46% of men in Chad are illiterate, 54% of boys against 48% of girls attend primary schools and 57.5% of boys and 26.9% of girls are in secondary school in Chad. In the Lake Chad Basin Area, the proportion of literate women is only 5.4% (PRESIBALT, 2020).</p>	78.0%	59.0%
Labor market	<p>Only 50 percent of women are in the labor force, compared to 73 percent of men. In addition, women are less likely to be in the formal sector and less likely to be gainfully employed. They do not have the same job opportunities as men, or when they do, they are more likely to work part-time. As a result, women are less productive and earn less than men. This widens the gender gap in earnings and productivity, reducing their ability to negotiate and have their voices heard to value their productive work (Tchana Tchana et al, 2021).</p> <p>The average value for Chad during that period was 56.42 percent with a minimum of 46.44 percent in 2020 and a maximum of 64.56 percent in 1990. The latest value from 2021 is 46.91 percent. For comparison, the world average in 2021 based on 180 countries is 50.13 percent. The rate of inactivity among young people is very high due to the weakness of the labor market, thus leading to significant social problems (delinquency, alcoholism, drugs, etc.) (Tchana Tchana et al, 2021).</p>	50.0%	73.0%
Income	<p>The income gap between the rich and the poor and the interregional inequality in Chad has widened (Gadom et al., 2018; Gadom et al., 2019). Although poverty declined by 8 percentage points between 2003 and 2011, the latest data on poverty from 2011 indicate that 47% of the population still lives below the national poverty line (MEPD, 2017). The recent oil price shocks, security threats to the region, and the Covid-19 outbreak add further vulnerabilities, and might increase the incidence and severity of poverty.</p> <p>The gender-disaggregated human development index (HDI) shows that women fall behind men in human development in Chad and that their deprivations are more pronounced in education and standard of living (UNDP, 2018). Access to finance allows the poor to invest in their education, health, start-up small businesses, or sustain existing ones, and manage their financial risks, thus boosting shared prosperity (Abor et al., 2018; Coulibaly & Yogo, 2020; Dixit & Ghosh, 2013; Kuada, 2019).</p>	53.3%	68.7%
Poverty	<p>Chad poverty rank is 89.40%. The UNDP Human Development Index (HDI) ranks Chad 185th out of 187 countries ranked in 2015, just ahead of the Central African Republic, the Democratic Republic of Congo and Niger, and remains one of the poorest countries in the world. Chad had a GDP per capita of USD 717 in 2022, and a large disparity between the rural (72% of the population) and urban areas. Two thirds of the population live below the poverty line.</p> <p>Despite the economic growth Chad has experienced thanks to oil revenues, the vast majority of the population lives below the poverty line. Chad remains ranked among the 10 poorest countries in terms of human development (UNDP,</p>	27.0 %	17.9%

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	<p>2014). The population's economic well-being index highlights large disparities between regions in terms of poverty levels. This index is calculated indirectly on the basis of information collected on housing and its characteristics and on household access to a range of consumer goods and services. In terms of well-being, there are very large gaps between the capital N'Djaména and the other regions of the country. Half of the population is classified in the poorest two quintiles; This proportion exceeds 50% in the regions of Batha (56%), Logone Oriental (54%), Mandoul (57%) and Ouaddaï (55%), and it is in the Sila region (70%) that the proportion of the population whose household is classified in the poorest two quintiles is, by far, the highest (INSEED, 2014).</p> <p>Mahamat Ibrahim A.T. (2020) explores the state of financial inclusion in Chad showed that the average Financial Inclusion Index (FII) was low, 24.89%, and it varied between 7.43% and 60.35%. and revealed that, despite its low level, financial inclusion was not smoothly distributed among the Chadian population (Gini coefficient of 0.196). The analysis of the financial inclusion inequality profile showed that there was a persistent financial inclusion gender gap in Chad, exacerbated by discriminations in education and income for women. This finding points to the importance of improving access to education in expanding financial inclusion in Chad.</p> <p>Thus, policy interventions should target the provision of formal accounts, a reduction of costs of financial services (withdrawal and debit cards), and promoting formal savings by developing adequate savings products, to foster financial inclusion in Chad. Furthermore, these policies should be gender-responsive while considering its interaction with education and income.</p>		
Gender Violence	In Chad, more than one-third of women aged 15-49 who are not single and (35%) have been victims of physical, psychological, or sexual violence committed by someone close to them (EDS-MICS, 2015). The road to gender equality is thorny, as evidenced by its 4th highest ranking in the world for gender inequality (UNDP, 2019). Human rights violations are fairly widespread, most often linked to cultural traditions and burdens and impunity.	65.0%	13.0%
Political participation	Although there have been improvements in government and in the management of state power, women are still under-represented. The number of women in each government has never exceeded 10, and they have generally occupied areas that relate to their social role (education, social action, promotion of women, health, etc.). From 3.4% of government members in 2000, women were 10% in 2006, 21% in March 2010 and 12% in 2011. At this level, the frequent reshuffles show an uneven evolution. In the senior administration, there is one woman ambassador out of 24, two (2) women prefects out of 56, four (4) women mayors out of 23 communes, six (6) women members of the Economic, Social and Cultural Council out of 30, two (2) women Secretaries General out of 29. No woman has been appointed to the position of regional governor. At the level of the Parliament, the current legislature has 28 women deputies (15%) out of 188 members of the National Assembly. The 2002-2011 legislature had 11 women deputies out of 155 (6%) (National Gender Policy, 2011)	9.0%	91.0%
Climate change impact (access to information, vulnerability, adaptation)	The populations of Chad are thus confronted with multiple risks whose effects reinforce each other: the risks of recurrent drought, severe and chronic food insecurity (in 15 of the 23 provinces - Sarr & Djoula, 2020), politico-military instability, insecurity linked to terrorism and the resulting displacement of populations (Vivekananda & Born, 2018), and the risks of flooding. Faced with these risks, the socio-economic and political difficulties facing the country perpetuate a fragile humanitarian situation over a large part of the territory and explain the vulnerability of the population to climate change. Women, children and the elderly have been identified as the social groups most at risk in Chad according to the National Adaptation Programme of Action for Climate Change (Republic of Chad, 2010) and the Nationally Determined Expected Contribution) (Chad Republic, October 2021).	64.0%	36.0%
Access to resources (e.g. land)	The agricultural sector employs 94.4% of households in Chad (PRESIBALT, 2020). According to the World Bank Data, 73% of the female population are active in the agricultural sector but do not have access to their own land (World Bank, 2019). Subsistence agriculture is the main livelihood strategy, with millet and sorghum as the main staples of men's production, and women primarily producing peanuts, sesame, and okra (Boyer et al., 2016). Women also rely heavily in	21.4%	65.0%

	<p>all three villages on firewood collection for supplementary income from harvest to planting seasons, and collect honey, chébé) (Boyer et al., 2016).</p> <p>Inequality related to access to and control of land is a reality in Chad. In its final report on gender issues in Chad, DAI Belgium highlighted this fact by indicating that only 15% of women own land. Based on international figures, rural Chadian women generally have very limited access to land ownership. Their ability to access property is often limited by their low incomes, their heavy family and domestic responsibilities leave them with little time to devote to income-generating activities, and it is usually men who are in charge of the more lucrative activities. In addition, in some communities in Chad, traditional beliefs persist, preventing women from being able to inherit land (UN, 2013).</p>		
Niger			
Socioeconomic aspect	Assessment (short description)	Women	Men
Demographic information	The Nigerien population is composed of 50.3% women and 49.7% men. Women and 49.7% men. It is also young. 51% of the of the population is under 15 years old. 84% of the population lives in rural areas. These characteristics, which are derived from the 2012 RGPH, are similar to those of African countries. Various socioeconomic indicators point to a situation of vulnerability. As for the place of residence of households, 84.4% are in rural areas. are in rural areas. Niger's population is predominantly Muslim (99 percent). Christians represent less than one percent (0.8%) and animism and other religions 0.2% of the population (EDSN-MICS IV, 2012).	50.3%	49.7%
Health	Life span is one of the most important demographic and health indicators. It shows the average number of years of a person's future life. That is, the future life of a person can remain theoretically unchanged provided that the current fertility and mortality rates remain unchanged throughout life. The average life expectancy at birth (both sexes) in Niger is 53.4 years. This is below the average life expectancy in the world, which is about 71 years (according to the United Nations Department of Economic and Social Affairs Population Division: 2022). Thus, according to this source, the average life expectancy of men at birth is - 52.1 years and the average life expectancy of women at birth - 54.7 years.	-54.7 years olds	-52.1 years olds
Education	Niger is one of the countries in the sub-region with the highest illiteracy rate. Indeed, the percentage of illiterate populations hovered around 71.7% in 2012. From the analysis of literacy in Niger, strong disparities can be observed between regions, and even between the sexes. Niger's population is extremely young: 48% of the population was under 15 years. Niamey has the highest rate of literacy (71%) compared to a national average of 29% in 2007-2008. Agadez has the second highest literacy rate at 48 percent. Analysis of the disparities observed between men and women in terms of illiteracy shows a feminization of illiteracy. Indeed, the proportion of illiterate women (75.5%) remains very high compared to that of men (67.8%) (EDSN-MICS IV, 2012). This observation is made not only in all regions of Niger, but also in the capital Niamey, where nearly 46.5% of women are illiterate, compared with 41.6% of men. In Niger, primary education remains the sub-system with the highest coverage rate. Nationally, the primary Gross Enrolment Rate is estimated at 76.2%, with 82.1% for boys and 70.2% for girls. (Gender Profile Niger 2017).	75.5%	67.8%
Labor market	Men aged 15-49 years show that a higher proportion than women working in Niger. As with women, the percentage of men who worked recently increases with age, from 58 percent at age 15-19 to a high of 91 percent at ages 40-44 and 45-49. The majority of women (67%) are working in the sales and services sector and slightly more than one in ten (11%) in agriculture. Only 5% are in management positions. In addition, 10 percent of the women worked in skilled manual labor and 2 percent worked as domestic workers. The number of children has little influence on the type of occupation of women. Similarly, regardless of marital status, it still in sales and services that women are working (EDSN-MICS IV, 2012). Depending on the region, with the exception of the Agadez and Niamey regions, at least half of the women are employed in the sales and services sector. In some regions, such as Maradi, Zinder and Diffa, these proportions are 84%, 79% and 77% respectively. It should be noted that in the Tillaberi region, one woman in five (21%) worked in agriculture. 57 percent of men are employed in agriculture; in addition, one out of five (20 percent) are employed in the sales and services sector. A small percentage of men (5%) are employed in management or technical occupations. (EDSN-MICS IV, 2012). An analysis of gender statistics shows that women's participation in the labor force is low. In fact, the activity rate is 36.5% for women and 82.5% for men. In urban areas, 26.8% of women and 65.6% of men are active. In rural areas, 38.6% of women and 86.5% of men are active (RGPH, 2012).	36.5%	82.5%
Income	The mean income earned by the women was N15,344.65 (\$42.62) per month. The major areas of contribution of the women to household expenditure were food (47.73%), clothing (12.13%) and children's education (9.12%).	28.0%	72.0%

	Men own 72% of the livestock compared to 28% for women, thus underlining the inequality between the two sex, just as in agriculture (National Gender Profile of the Agriculture and Rural Development Sectors – Niger 2020). In Niger, the final decision on how to use her income is mostly made by women. Overall, in 85.8% of cases, it is the woman who decides how to use her earnings, compared to 6.8% of cases where it is the man who decides (Gender Profile Niger 2017).		
Poverty	Poverty affects 45.4% of Nigeriens according to the 2014 ECVMA, compared with 48.2% in 2011. The poverty situation hides disparities according to the area of residence. Poverty in Niger is rural. Thus, 94.1% of poor households live in rural areas and 54% of poor male-headed households live in rural areas compared to 40% of female-headed households. According to the sex of the head of household, 32% of female-headed households are poor, while the rate is 46.9% for male-headed households. Also, in terms of depth, the poverty rate is 13.8% for men and 9.4% for women. In terms of inequality, poverty is characterized by a greater disparity among households headed by women than those headed by men. Indeed, inequality in living conditions is higher in female-headed households than in male-headed households (0.335 for women versus 0.321 for men in 2014).	9.4%	13.8%
Gender Violence	In Niger, the overall prevalence of GBV during life is 29.0%, i.e. 38.2% for women and 16.3% for men, according to the study on the scope and determinants of gender-based violence conducted in 2021, according to the Ministry of Women's Promotion and Child Protection. The family environment is the main place of production, as shown by the following statistics: 1.7% of women have been raped in their lifetime, compared with 0.1% of men; 5.1% of women have been sexually assaulted in their lifetime, compared with 1.8% of men; and 11.8% of women have been physically assaulted in their lifetime, compared with 3.3% of men, said the study, quoted by Ms Tamponé, who said that "domestic violence is a reality in Niger" (ANP, 2021). In the same 2021 for example, through the "Spotlight Initiative" program, a field survey was conducted to update the databases on GBV. Women and girls are the most targeted by GBV. Overall, the prevalence of GBV during the course of one's life is 29% (38.2% for women and 16.3% for men). In the course of their lives, 3.9% of respondents said they had been victims of at least one sexual assault, i.e. 16.1% of women and 1.8% of men.	38.2%	16.3%
Political participation	Niger has had a law establishing a quota for women in elected and appointed positions since June 2000. This law was first amended in 2014 to increase the quota for women in elective positions from 10 to 15 %, and then in 2019 to further increase the rate: from 15 to 25 % for elective positions and 25 to 30 % for appointment positions. 84.2% of the Nigerien National Assembly is composed of men and 15.8% of women. This low representation of women may partly explain the limited progress in implementing the promotion of equity or equality between men and women in Nigerien society Ministerial positions in Niger are still entirely male. Indeed, 81% of ministers are men, compared to only 19% of women. The majority of the secretary's general of the ministries are men. There are 92.85% men in this position compared to only 7.15% women (Gender Profile Niger 2017).	14.0%	86.0%
Climate change impact (access to information, vulnerability, adaptation)	Indeed, Nigerien women are involved in both subsistence and cash crop farming, which is a major source of household income. Women are also often responsible for marketing garden produce, looking after small livestock and marketing livestock by-products. In the areas most affected by the negative impacts of climate change, it is women who play the role of head of household, in the absence of husbands who have left for the countryside. Moreover, Nigerien women farmers are largely dependent on rainfall, which is itself highly exposed to climate variability. Women, who make up a large proportion of the agricultural population, the pillars of agricultural production systems in our countries, are the most sensitive to the impacts of climate change. (Toudjani, Niger: women, agriculture and climate change, 2016). The latest General Census of Agriculture (2007) reveals a total of 1,627,294 agricultural households (1,519,144 male heads of household, or 93.4%, versus 108,150 female heads of household, or 6.6%).	76.6%	48.4%
Access to resources (e.g. land)	The proportion of women working in agriculture reduced from 40% in 2006 to 11% in 2012, illustrating the defeminization recalled by Marthe Diarra and Marie Monimart (2004) and taken up by Marie Sophie Chalier et al (2014). This is due to changes in land tenure which is as a result of progressive unavailability of vacant land and demographic increase, and which leads to women being the first victims. In addition, they are dispossessed of their natural right of access on the grounds of Islamic-customary arguments according to which the woman (sister-wife) remains under the guardianship of the man who must take care of her needs (food and money) and in which case she is not obliged to own or cultivate her own plot of land. These arguments are still conveyed and maintained in the collective memory of rural societies in order to stifle any phenomenon of inheritance of land to the benefit of the woman. (National Gender Profile of the Agriculture and Rural Development Sectors – Niger 2020). Overall, 63.8% of women versus 44.7% of men do not own any land. (Gender	63.8%	44.7%

	profile Niger 2017). Traditionally, access to land is more favorable to men in all regions of the country. Indeed, 79.8% of male-headed households own at least one field compared to only 4.6% of female-headed households. Women's poor access to land has a negative impact on their use of other productive resources such as inputs, credit and technical support. In terms of livestock, men generally own large livestock, while women raise small ruminants and poultry.		
Nigeria			
Socioeconomic aspect	Assessment (short description)	Women	Men
Demographic information	The Sex Ratio in Nigeria in 2021 is 102.78 males per 100 females. There are 107.15 million males and 104.25 million females in Nigeria. The percentage of female population is 49.31% compare to 50.69% male population. Nigeria has 2.90 million more males than females (World Population Prospects 2019). Nigeria is a federation system of government comprising 36 States and the Federal Capital Territory, 774 Local Government Area (LGAs) and 9,565 wards. The States are grouped into six geo-political zones: South-South, South East, South West, North East, North West, and North Central. An estimated 48% of its population resides in urban areas while 52% live in rural areas. As of January 2019, it is estimated that there are 200.9 million Nigerians living in Nigeria. Of population, 49.3% are female and 50.7% are male (NBS, 2021). However, women in Nigeria face several challenges as a result of social, cultural and institutional factors. Gender inequality is observed in areas such as employment, mortality rates, school drop-out rate and number of women occupying appointive and elective positions within government.	49.3%	50.7%
Health	The impact of climate change on human health depends critically on the success to adapt to climate change in the other sectors. The women, the poor and other vulnerable groups are likely to be at risk of food insecurity as a result of climate change more than men. Significantly, the effects of climate change on human society and the ability to mitigate and adapt to them are also impacted by social factors such as gender. The average life expectancy at birth (both sexes) in Nigeria is 47.6 years. This is below the average life expectancy in the world, which is about 71 years according to the Population Division of the United Nations Department of Economic and Social Affairs. Thus, the average life expectancy for males at birth is 46.8 years and 48.4 years for females (United Nations Department of Economic and Social Affairs Population Division, 2022).	-48.4 olds years	-46.8 olds years
Education	Educational level is a major factor in income distribution. The level of education determines the level of income that an individual receives and either it will be in the wage-earning category or not. The result shows that the larger percentage of the "no wage" category have primary school education (40.33%) followed by those with secondary school certificate (26.27%). About 50.83% of those with paid employment have tertiary education, followed by individuals with secondary education (32.37%). This also confirms the prior expectation that more years of schooling should be income rewarding. Hence, inequality as the result of education is due to years of schooling. As more of the general populace attend school, the lesser the inequality as a result of education. The service sector offers more paid employment than the other sectors with 86.92%, followed by the industrial sector with 8.29% (Oluyemi Theophilus Adeosun, and Kayode Ebenezer Owolabi, 2021). Despite increased awareness of gender mainstreaming, there exist disparities between men and women, especially in the socio-economic and socio-political sphere. For example, The National Bureau of Statistics in 2018 records 59.3% literacy level for women as opposed to 70.9% literacy level for men. In addition, women employees in civil service was recorded at 38.16% as opposed to men employees 68.84% in 2016. The same is reflected in the political sphere where men constitute 94.71% of the National Parliament, from 1999 – 2015. The underlying issue is the imbalance between men and women representation in the social, political and economic sphere. Education gender gaps as high as 17% at the primary level, 13% at the secondary level and 30% at the tertiary level of education have been experienced in 2020. Just 58% of Nigerian girls attend primary school, 47% of them are in secondary school and only 8.3% eventually go to college (World Economic Forum, 2020). In its report, UNESCO (2018) stated that Nigeria has a 62.02% adult literacy rate. The male literacy rate stands at 71.26% and the female at 52.66% (an obvious imbalance from the difference in access to education).	40.7%	29.1%
Labor market	Female unemployment rate of 8.72% in 2020 and a slightly lower male unemployment rate of 7.34% (The Global Economy, 2020). In addition, women employees in civil service was recorded at 38.16% as opposed to men employees 68.84% in 2016. Crude oil exports are the main source of revenue, agriculture accounts for 25% of GDP and nearly 60% of labor. Small scale manufacturing contributes to 10% GDP. Weak human capital due to under-investment and ranked by the World Bank 152 out of 157 countries in human capital index.	48.4%	63.5%

	The labor force participation rate is low for the Nigerian population overall (56% for populations aged 15-64), with a female-to-male labor force participation ratio of 75.7% in 2012, lower than the Sub-Saharan Africa average (84.3% in 2012), indicating lower female participation (48.4%) than male participation (63.5%). In terms of the quality of these activities, women are overrepresented in the informal sector. In the formal sector, they are confined to low-level, more flexible positions that allow them to assume the responsibilities associated with reproductive work (Gender Profile, 2019).		
Income	The mean income earned by the women was N15,344.65 (\$42.62) per month. The major areas of contribution of the women to household expenditure were food (47.73%), clothing (12.13%) and children's education (9.12%). The results further revealed that the significant factors influencing women's contribution to households' welfare in the study area were age, level of education, savings, remittances, training on entrepreneurship and access to credit. Therefore, measures that will increase the income generated by rural women should be put in place so as to boost their contribution to the welfare of their households (Falola, Abraham et al. 2020). In Nigeria, sociocultural factors such as the preference for educating boys over girls, pressure to marry early, unwanted pregnancy and lack of funds to expend on empowering both male and female children continue to impede women's (economic) empowerment. Since women are disadvantaged in enrolment and access to educational facilities, they are often unable to complete their education and are restricted to semi-formal and informal employment. A recent study showed that 44% of Nigerian women are involved in buying and selling of goods, 39% work in agriculture while 6% of them work in the manufacturing sector. Female domination in these areas which largely require semi-skilled labor often translates to low income (Gender Country Profile Nigeria, 2021-2024).	34.3%.	65.7%
Poverty	In 2022, an estimated population of 88.4 million people in Nigeria lived in extreme poverty. The number of men living on less than 1.90 U.S. dollars a day in the country reached around 44.7 million, while the count was at 43.7 million for women. Overall, 12.9 percent of the global population in extreme poverty were found in Nigeria as of 2022 (Dokuu Sasu, 2023). Poverty in Nigeria is gendered. Some studies have noted that women in Nigeria were twice as likely as men to live below the poverty line. Although the Nigerian Living Standards Survey 2018-2019 indicated that female led households are less likely to suffer poverty, this finding has been questioned, especially in light of the number of households led by females (which are fewer in number) and the fact that the main determinants of poverty lie outside of only money (as employed by the Nigerian Living Standards Survey). With respect to banking, nearly 7 in 10 women are unbanked, with more than half of them financially excluded from traditional financial structures (Gender Country Profile Nigeria, 2021-2024). Poverty and inequality cut across men and women with the most recent study from the NBS indicating that 4 in 10 Nigerian, both men and women, are poor. However, poverty is also gendered, with women disproportionately affected. The study found that poverty affects many aspects of life including financial inclusion, access to essential services such as education and health care. This creates a vicious cycle where people, in particular women, are unable to save and be included in structured financial systems where they can borrow money to start up a business. Much more research is needed into the rates of female poverty in Nigeria, to understand the true prevalence and to help provide information (Gender Country Profile Nigeria, 2021-2024).	52.2%	47.8%
Gender Violence	The incidence of gender-based violence (GBV) is growing astronomical with the activities of the insurgency in the North East. From forced and early marriages to the physical, mental or sexual assault on a woman, 1 in 3 Nigerian women have experienced physical violence by age 15 (NDHS 2013). UNFPA targeted areas of intervention is to improve the gender-based violence policy environment at national and state levels. The fund works with a variety of partners to provide survivors with medical, reproductive health services and/or psychosocial care as part of our commitment to rehabilitate women and girls who have been abused and to help them overcome their ordeal. According to the 2018 National Demographic Health Survey (NDHS), 33% of women age 15-49 in Nigeria have experienced physical or sexual violence; 24% have experienced only physical violence, 2% have experienced only sexual violence, while 7% have experienced both physical and sexual violence. This study recorded more cases of sexual based gender abuse compared to physical and emotion abuse. Additionally, the proportion of cases of physical/emotional violence (96.29%) to the total cases of GBV per year was higher in 2020 compared to 2019 and 2018 (Onyinye and al, 2022). There have been increased effort to address gender-based violence in Nigeria. While violence affects both men, women and children, women and girls are disproportionately affected by all types of GBV prevalent in Nigeria. There has been progress in eradication of GBV, including advocacy and domestication of the Violence Against Persons' Prohibition Act,	56.3%	33.7%

	2015. However, the spike of violence against women and girls COVID-19 pandemic and high numbers of violence suggests that continued effort is necessary (Gender Country Profile Nigeria, 2021-2024).		
Political participation	<p>Since 1999, when Nigeria returned to democracy, women's representation has not exceeded the 10% threshold across the legislature and the executive. This is significantly less than the 35% projected by the National Gender Policy (Gender Profile, 2021).</p> <p>In Nigeria, the extant National Gender Policy (NGP) recommended 35% affirmative action instead and sought for a more inclusive representation of women with at least 35% of both elective political and appointive public service positions respectively. The under representation of women in political participation gained root due to the patriarchal practice inherent in our society, much of which were obvious from pre-colonial era till date (Oloyede Oluyemi, 2016). After the 2019 legislative elections, the Nigerian Senate elected 8 women (7.34%) out of 109 members and the House of Representatives elected only 13 women (3.61%) out of 360 members. These figures fall well below the global average of 26.1% of women in parliament, and the objective of gender parity. (Inter-Parliamentary Union,2022)</p>	5.5%	94.5%
Climate change impact (access to information, vulnerability, adaptation)	<p>Adverse climate impacts have affected women in their everyday roles as home managers and workers. On one hand, they have complained about low employment, reduced earnings, the dearth of local herbs for treating ailments. On the other hand, they have bemoaned increase spending on food, high incidences of diseases and medicines (asthma, malaria and diarrhea), malnutrition, and the high death toll among women due to fatigue from long walks in search of water and firewood.</p> <p>The World Bank indicates that across the nation, 60% male- headed households and 48% female-headed households participate in Agriculture.</p> <p>African Development Bank (AfDB) has indicated that Nigerian women contribute 70% of agricultural workforce.</p> <p>The above shows that women and men in Nigeria are affected differently by the impacts of climate change on agriculture occasioned by extreme weather events based on their different levels of involvement in the sector.</p> <p>A study published by the Building Nigeria's Response to Climate Change Project showed that an increase in pests and disease due to climate change had increased the time women spent caring for the sick and their workload (BNRCC 2011).</p>	75.0%	35.0%
Access to resources (e.g. land)	<p>According to the Federal Ministry of Agriculture and Rural Development (FMARD) women account for 75% of the farming population in Nigeria. But considerable land-related gender disparities exist where women own less than 10% of the land due to gender-biased inheritance practices. They also lack access to productive resources, extension service and farm inputs, which hinder rural women's food production and food security (Nigeria gender, 2019). Women are heavily involved in the production and trading of agricultural products both in the rural and urban areas. They are also involved in the fishing and animal husbandry.</p> <p>In the agricultural sector, the Food and Agricultural Organization (FAO) of the United Nations records that women constitute a significant majority of smallholder producers and contributes 60-79% to the agricultural value chain for food production, processing and marketing, raise poultry and small ruminants (FAO CPF, 2012-2017).</p>	10.0%	90.0%

Communities' expectations in relation to the project

During the consultations, information was gathered from communities on their actual problems and expectations in relation to the project. These have been compiled in the **Table A.4.1.5** below.

Table A4.1.5. Communities' problems and expectations in relation to the project

COUNTRY		CAMEROON	
Pilot Sites		Kousseri	Meri
Women	<p>Women have a real problem of access to land which limits their empowerment and remain marginalized even when it is established that the land is for the couple. Also, women complain about not having access to drinking water. Manual boreholes are not efficient because of the drought and access to drinking water is time consuming and tiring. During the dry season, women spend more than eight hours for just 20 liters of water. That's why it is children duty to bring water in the household and it affects girls' schooling. Women expect the project facilitates access to drinking water for households. It was explained to them that the proposed project does not address this issue directly, however it contributes to assess the quality of the water and contribute to an integrated water resource management.</p>	<p>It is more difficult for women to access information and to get strategic position in the community. Women need the project to rely on women channel and way of communication to empower their communication and information skills. Women are facing drought and are unable to adapt their traditional knowledge, and usual and known seeds for farming because of the erosion damaging their soil, and climate disturbing their farming calendar. Access to drinking water has also been highlighted by women. Women expect from the project to learn and be trained on how to adapt new farming techniques to traditional ones in order to improve the quality of the soils and their productivity to help fighting against food insecurity and enhance their income.</p>	
Youths	<p>The National Youth Council in Kousseri does not clearly develop girl-oriented activities. Nor are there any systems or mechanisms for monitoring the few mixed-gender projects that are funded. Youth want the project to develop activities that are adapted to their real needs as empowerment in farming activities after inundation. Nevertheless, they have set up a network of information and communication between young people and for the problems of young people: the written press, platforms in social networks, community radios, awareness campaigns, mass meetings. Accordingly, youth are connected through social networks all day and have access to considerable data and information around the world. This gives them an edge over their parents or elders who no longer have a monopoly on information and that gives them some power and to impact positively on their livelihoods. Youth are expecting the project to rely on them, to train them for new skills based on some cultural tricks to improve data sharing in inaccessible areas.</p>	<p>No specific issues and expectations highlighted</p>	
Disabled People and others vulnerable groups	<p>No specific issues and expectations highlighted</p>	<p>No specific issues and expectations highlighted</p>	
COUNTRY		CENTRAL AFRICAN REPUBLIC	
Pilot Site		Bossangoa	
Women	<p>The gradual viability of basic social services such as health and education in the Central African Republic must be based, among other things, on the water supply and sanitation sector, which is currently very weak due to the rise in insecurity, the breakdown of the social contract and climate change. The Joint Monitoring Programme (JMP) of UNICEF and WHO estimates that the rate of access to drinking water in CAR is only 6% and the rate of sanitation coverage is 14%. 60% of women in Bossangoa are involved in the shea butter processing value chain. This is their main source of income. However, the abusive exploitation of its bark and the multiple bush fires constitutes the main obstacles to the sector. For these women, the project should organize training so that they are actively involved in the preservation of the forest and the soil. The level of education has deteriorated among young people and interest in studies has declined in favor of diamond and gold mining. This is the main occupation of young girls and boys on weekdays and during school hours. Women and men gathered during the focus groups in Bossangoa expressed their expectation that the Project would facilitate access to drinking water and limit the drudgery of old people who no longer have the strength to pump water and save time for young girls who often do not have time to go to school because of the long waiting lines. It was explained to them that the proposed project does not address this issue directly, however it contributes to assess the quality of the water and contribute to an integrated water resource management. The women say they will benefit from training under the project so that they can be actively involved in taking charge of forest preservation in order to maintain or improve their income from shea production. They also hope for workshops to raise awareness of integrated water resource management (IWRM), which will surely consider the production, collection, transportation and processing of shea: two large shea cooperatives exclusively include ex-associates, vulnerable women and girls. The women hope that the two large women's groups that have already proven themselves will be associated with the project as a space for capacity building, training and sensitization.</p>		

Youths	Young people actively participate in climate change through the intense practice of bushfires as a hunting technique and a main activity for the conversion of former fishermen. The young people also practice shifting agriculture, which is harmful to the environment. The youth suggest that the project develop income-generating activities oriented towards agroforestry. The youths expect that the project support awareness campaigns and training in agrometeorology to adapt to drought needed for innovative agriculture manner.
Disabled People and others vulnerable groups	The city of Bossangoa is full of many people living with disabilities, a total of 600 people. Blind people make up more than 80% of these people. There are children, young people, women and the elderly. They expect the project facilitate the development of hydro-agricultural areas on the Dam River for the blind to facilitate the practice of market gardening, which is their main source of income and a source of conflict with women. It was explained to them that the proposed project does not address this issue directly, however it contributes to assess the quality of the water and contribute to an integrated water resource management.
COUNTRY	CHAD
Pilot Site	Bol
Women	Climate change makes their lives difficult because of the scarcity of materials and floods that raze houses made of temporary materials, and women find themselves building the same huts every year. However, in both rural and urban areas, there is a serious problem of access to credit, finance and other means of production such as arable land. For this reason, women and girls remain the main agricultural labor force on men's land and those who do the drudgery of drinking water increasingly scarce because of the high salinization of lake water and water tables with sour taste according to the populations. For this reason, the water from many boreholes is not consumed. Women expect from the project contributes to accessing drinking water. It was explained to them that the proposed project does not address this issue directly, however it contributes to assess the quality of the water and contribute to an integrated water resource management. The women of Bol are for the most part illiterate and have problems accessing land and information confiscated by men who have difficulty introducing them into the decision-making spheres. As a result, they do not benefit from developed arable land and malnutrition affects many children and pregnant women. Women fear that the project will reinforce the disparities related to access to information. They suggested that the project strengthen their organizational capacity, support them and accompany them technically and financially through income-generating activities so that they can benefit from new skills to improve their agricultural practices in order to fight against food insecurity by mastering the management of agrometeorological information.
Youths	With the floods, girls have become resources for families through more forced marriages, resulting in school dropouts. As a result, parents leave more boys in school and girls in marriage or in the fields as agricultural labor. During the socialization of girls and boys, it is important to review the sexual division of labor, which is a mechanism that oppresses women and girls. To this end, parents and husbands should be sensitized and households should be trained on GBV. The young people suggest that the project sensitize the parents within the itinerant or mobile schools called "schools of husbands and fathers" for the good practices of socialization and their education on women and girls rights. It was explained to them that the proposed project does not address this issue directly, however such aspects can be mainstreamed in the knowledge and awareness campaigns planned under the framework of the project.
Disabled People and others vulnerable groups	No specific issues and expectations highlighted
COUNTRY	NIGER
Pilot Site	Diffa
Women	In the resettlement sites for displaced persons and refugees, there are more women and children, with a high proportion of widows and elderly women. There is also a real problem of access to land, which often results in conflicts and court cases. As a result, there are social tensions between refugees, who are better off, and the host populations, who are poor and weakened by the Boko Haram crisis and floods stress. Women and youths as well as the elderly are today victims not only of water stress and insecurity, but also of pressure on dwindling resources due to population growth driven by Nigerian refugees and IDPs. This has increased the poverty level of households. They expect that the project rely on elderly women to sensitize and train communities on new weather forecasting techniques because these women are more listened to and aware of climate change and the outdated nature of endogenous knowledge as a response to current water stress.
Youths	The high rate of illiteracy among the adult population, rapid population growth, poverty and recurrent crisis situations represent major constraints to the mobilization of the resources necessary to ensure access to quality education for all children, regardless of their social background. Girls and children living in rural areas and in the regions of Diffa are among the most exposed to abuse and sexual violence while going to fresh water sometime very far and when selling small handicrafts or some commerce. Also, the security crisis and the floods have led to the proliferation of survival sex among girls aged 12 to 15 who are orphans or unaccompanied children. Many ends up pregnant, raped, and even killed. Girls expect from the project to enhance their skills and be trained on new skills for small handicrafts or some commerce relate to their resilience on climate change and poverty in order to improve their income and to facilitate their self esteem and social's image restauration.
Disabled People and others vulnerable groups	Women and girls with disabilities are also considerable in Diffa. Women and youths as well as the elderly with disability are today victims not only of water stress and insecurity, but also of pressure on dwindling resources due to population growth driven by Nigerian refugees and IDPs. Many of them are begging on the streets and are constantly abused. Disabled women, girls and elderly expect from the project to enhance income-generating activities related to climate change adaptation.

COUNTRIES	
NIGERIA	
Pilot Site	
Hadejia	
Women	<p>During consultations, women considered that this proposed project will contribute to improve access to irrigation and drainage services and to strengthen institutional arrangements for integrated water resources management, with the overall aim to support agricultural productivity improvement in selected large-scale public schemes in northern Nigeria with more than 25 thousand hectares in Hadejia Valley Irrigation project for example. But the huge project is not gender sensitive and men are the main beneficiaries. It has improved men livelihood and status, but still women are not really gaining from it as individual or groups because men are not sharing or spending their income with their families.</p> <p>Women of Hadejia are doubly impacted by the misery caused by the floods and the illiteracy that complicates their lives insofar as they alone are responsible of the households for the well being of the family, health, education and schooling of their children. To improve their income, they are obliged to develop profitable activities as laborers in the men's fields during the harvests and to use the children as additional laborers for small businesses to the detriment of their schooling.</p> <p>It still difficult for their business because they are moving constantly around regarding the frequency of the floods. Accessing to drinking water is very difficult for the women, tiring and time-consuming activity because very far and less boreholes are available.</p> <p>Women request the project is to have access to a permanent settlement in order to run a constant and permanent business; because they are heading the households for the seek of the culture, but they become poorer and economically weak when there are always moving around on the frequencies of inundations.</p> <p>Women also expect from the project to improve their livelihood by providing technical and financing support for income-generating activities related to their resilience to climate change and frequent inundations. It was explained to them that the proposed project does not address this issue directly, however it contributes to assess the quality of the water and contribute to an integrated water resource management.</p>
Youths	No specific issues and expectations highlighted
Disabled People and others vulnerable groups	No specific issues and expectations highlighted

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A4.2 GENDER ACTION PLAN

Project objectives and components

The main objective of the project is to increase the resilience of the population in the Lake Chad Basin, with a special focus on Gender mainstreaming, by enhancing the countries capability to manage and adapt to climate-related risks through improvement of hydrological monitoring, data systems and service delivery and awareness on climate-related hazards. The impacts of these hazardous events, which affect men and women differently, are already being experienced in the region, but its effects will increasingly impact infrastructure, health, water security, live and livelihoods of the population, as well as the integrity of the Basin's ecosystems. The proposed project has therefore been designed to address risk management and adaptation, through six components, as follows:

Component 1. Improvement of hydrological and meteorological observing system networks

Component 2. Strengthening regional hydrometeorological information systems (database and data sharing mechanism)

Component 3. Identification and development of hydrometeorological products and services

Component 4. Training of project stakeholders and knowledge development

Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services (communication and timely diffusion of appropriate product and services to end users)

Component 6. Plans and communities' response capacity

The detailed description of the project's outcomes, outputs and activities is presented in Part II, section A. of the proposed project.

Gender-responsive measure associated with project outputs/activities – Gender Action Plan (GAP)

Gender-responsive measures are foregrounded to demonstrate how the project addresses differential gender needs, equitable participation and equitable distribution of benefits, resources and rights. In view of the differentiated vulnerability of women, youth and men to climate change and extreme events such as droughts and floods, the project will aim to improve the access of accurate and usable hydroclimatic information for a better resilience of local communities, with attention to inclusion of women and marginalized and vulnerable groups, and to equal access to benefits. By facilitating the participation of women in the programme and their access to climate information, decision-making processes related to hydromet decisions, and gender responsive planning for climate resilience, this project will play a strategic role in promoting the resilience of women active in the agricultural sector against climatic hazards. The assessment described in A4.1 above helped design a gender transformative approach for implementation of the project.

The proposed project incorporates gender related concerns in particular through:

- The development early-on during implementation of a *Gender-responsive stakeholder engagement strategy and action plan (activity 5.1.2)*. This strategy and action plan will build on the GAP and will provide specific guidance and tools, including guidelines and checklists for gender mainstreaming, for implementation of the project activities. Implementation of this strategy and action plan is the focus of activity 5.1.3, and support will also be provided under this activity to the institutionalization of the process to ensure continued engagement beyond the project implementation.
- The mobilization of the *Training Manual for Gender Mainstreaming in Flood and Drought Risk Forecasting and Management*, developed by WMO. The Training Manual will be an important resource for the project, and actors will be trained using this Manual (activity 6.1.4).
- A focus on gender-responsive planning, through the development of gender responsive community contingency plans (activity 5.4.2), of a gender-responsive basin-level drought management plan and flood management plan (activity 6.1.2), and of gender-responsive risk mitigation and climate resilience community plans (activity 6.2.3).
- In a cross-cutting manner, a focus on participation of women and marginalized and vulnerable groups in consultations and activities, and on gender disaggregated data. Attention will be placed on ensured that associations and representatives of such groups and gender experts can actively and effectively participate in the consultative processes and trainings facilitated by the project. For example, women's groups will be targeted in the development, approval and use of the tools and methodologies in relation to warnings to ensure that they are understandable and respond to their specific needs.

These approaches will increase the participation of women, girls and other vulnerable groups in flood and drought management activities and decision-making processes, and improve the equal access to benefits. It will enable women to contribute as agents of change in all circumstances, with climate change actions then benefiting from the ideas, knowledge, and other resources they bring to develop effective and sustainable climate change adaptation and mitigation solutions.

Table A4.2.1 outlines the Gender Action Plan (GAP) with specific actions per Output of the project. To determine impact and the relevance of interventions, sex-disaggregated data must be collected as far as possible, especially for the purpose of formative a summative assessment and evaluation. As described in Part III, section E. on the results framework, the project proposal integrates several key performance indicators (KPIs) linked to gender and social inclusion. These include quotas to ensure equal participation in meetings, consultations and training sessions on information disseminated through early warning systems.

The budget allocated to the GAP has been integrated in the overall budget associated with the project activities, as presented in Part III, section G.

Monitoring and evaluation

The technical officer hired by GWP-CAF, who will be part of the PMU, will be responsible for Gender Action Plan (GAP) in coordination with the Project Manager. The officer will be trained on gender issues by GWP. The

officer will be responsible for reporting semi-annually to the Executing Entities (GWP-CAf and LCBC) and Implementing Entity (WMO). In addition, during periodic meetings organized to monitor the progress of the project, the officer will report on any potential gender risks that have arisen that have not been previously identified. He/she will be responsible for updating the Gender Action Plan during the first year of the project as the gender-responsive stakeholder engagement strategy is developed, as well as whenever unforeseen impacts and risks are identified.

The Implementing Entity will designate a responsible officer to oversee compliance with the Gender Action Plan (GAP). This officer shall work in conjunction with the GWP-CAf technical officer and the PMU to ensure compliance with all conditions.

General Operating Principles:

1. Both the Executing Entities and the Implementing Entity will ensure compliance with the Adaptation Fund's Gender Policy.
2. The updates to the Gender Action Plan will be presented by the PMU with the support of the project officer to the Project Steering Committee.
3. The Project Steering Committee will review the gender-related aspects of the evaluation report.
4. The project officer will report on progress with the Gender Action Plan for the quarterly reports as well as for the annual reports.
5. The Implementing Entity will incorporate the annual reports and the feedback by the Steering Committee in the Annual Report to the Adaptation Fund.

Table A4.2.1. Gender Responsiveness of Project Outputs/Activities and Action Plan (GAP).

Project Outcomes/ Outputs	Project Activities	Gender-related Key Performance Indicators (KPIs)	Gender-related Baseline (2022)	Gender Action	Target Gender Achievements	Means of Verification of the Gender aspects
Component 1. Improvement of hydrological and meteorological observing system networks						
Outcome 1.1. Strengthened institutional capacity to monitor and detect climate related hazards, thereby contributing to reduce socioeconomic and environmental risks and to protect lives and livelihoods						
Output 1.1. Hydromet observation network modernized/established	1.1.1 Carry out a detailed analysis of the Hydromet monitoring system (including weather, surface water, groundwater and water quality), and propose possible upgrades of the existing equipment aiming for state-of-the-art data collection e.g. through the use of the Global Hydrometry Support Facility (WMO HydroHub) Innovations Calls.	Number (#) of stations placed in the most vulnerable areas for women and other marginalized groups Percentage (%) women participating in trainings and workshops	Baseline to be determined with the inventory of the existing stations, wherein it will be assessed whether the existing stations are located in the most vulnerable areas for women and other marginalized groups No participation of women in maintenance and operation of stations	Detailed inventory and design of an optimized network taking into account the most vulnerable areas for women and other marginalized groups 2 Regional Training on installation and maintenance of the stations, including Training-of-Trainers (at least 25% are women)	All stations (rehabilitated and new) are placed in the most vulnerable areas for women and other marginalized groups At least 25% women participating in trainings and workshops	Report of the analysis and inventory of the existing and new stations Bidding documents Reports of the Regional Trainings; training materials; and lists of participants
	1.1.2 Rehabilitate and upgrade old stations and install new stations, including training in operation and maintenance of the stations					
	1.1.3 Document and strengthen collaboration and synergies with other projects developing different monitoring methods for the local conditions (remote sensing, AI, crowdsourcing), in order to develop a catalog of innovative methods and techniques implemented in other countries or in similar conditions that could be applied in the Lake Chad basin and explore their implementation at the regional level					
Output 1.2. Sustainable funding mechanism for Hydromet monitoring identified	1.2.1 Carry out an analysis of the organizational and institutional frameworks of the NMHSs, including the existing legal basis, funding and partnership arrangements, and propose a strategy for sustainable management (operation and maintenance) of monitoring networks	Percentage (%) of women participating in the development of the strategy	No strategy	Women participate in the development of the regional strategy for sustaining O&M of monitoring networks	At least 10% women participate in the development of the regional strategy	Reports of meetings/workshops; and lists of participants Progress reports
	1.2.2 Identify and recommend different financing models of the NMHSs - including involving private sector					

	stakeholders - to build value chains for hydrological and meteorological information					
Component 2. Strengthening regional hydrometeorological information system (database and data sharing mechanism)						
Outcome 2.1. Enhanced regional cooperation for improved information systems and services with a seamless approach for use in planning and decision-making						
Output 2.1. A tailored regional interoperable database owned and managed by LCBC and NMHSs	2.1.1 Perform Quality Assessment and Quality Control of historical data of the stations of the project monitoring network in terms of availability, quality, gaps, completeness in both the national and regional databases, transfer/update of any missing data to the regional database from both ground and satellite-based data (at regional level)	Number (#) of trained staff (of which 30% are women)	Baseline to be determined at the inception phase from existing reports of past trainings related to the implementation of the Lake Chad Information System (LIS)	Women participate in trainings and workshops	At least 30% of the trained staff are women	Reports of past trainings related to the implementation of LIS; and lists of participants Reports of meetings/workshops, trainings, and field visits; and lists of participants Progress reports
	2.1.2 Update/define and institute procedures and routines for data acquisition, quality control, and archiving at the LCBC and in the NMHSs of the five participating countries [taking into account the assessment done under 4.1] (both at regional and national levels)					
	2.1.3 Upgrade the IT infrastructure (hardware and software, including cloud) to support the operation and transfer of the data from national to regional database (at both regional and national levels)					
	2.1.4 Develop/strengthen a regional database management system according to WMO guidelines to meet the needs of all users, including graphical visualization of main observed variables in real time at the key stations of the network (at regional level)					
Output 2.2. Appropriate data sharing agreements in place and agreed data exchanged using appropriate platforms and standards	2.2.1 Define data exchange mechanisms and procedures; update existing procedures (as required), in relation to new and innovative data and information exchange methods taking into account existing WMO data exchange and metadata registration tools (WIGOS, WIS2.0, WHOS, OSCAR)	Number (#) of trained staff (of which 30% are women)	Baseline to be determined at the inception phase from existing reports of past trainings related to data-sharing	Women participate in trainings and workshops	At least 30% of the trained staff are women	Reports of past trainings related to data-sharing; and lists of participants Reports of meetings/workshops, trainings, and field visits; and lists of participants Progress reports

	2.2.2 Develop/update data sharing protocols according to WMO unified data policy taking into account the relevant agreements developed by LCBC and signed by the 5 countries, including the Water Charter that outlines the responsibilities for operation and maintenance of the regional database management system					
	2.2.3 Develop an inventory of existing data and metadata publication tools, web services, data formats, data and metadata standards, and vocabularies within LCBC and Member States (to complement ongoing activities in LCBC's projects such as the Knowledge Management Platform from PROLAC project)					
	2.2.4 Implement free (and open source) data exchange tools and web services supported by WMO and conducting capacity development (to complement ongoing activities in LCBC's projects such as the Knowledge Management Platform from PROLAC project)					
Component 3. Identification and development of hydrometeorological products and services						
Outcome 3.1. Enabling environment created for understanding and addressing the user needs						
Output 3.1. A transboundary EWS mechanism designed, based on national needs and transboundary policies, including regional guidance and advisories by LCBC	3.1.1 Launch regional consultations to gather information and make recommendation on: (a) the effective coordination between national and transboundary policies in the context of flood and drought management and climate adaptation; and (b) the information and dissemination modes [regional consultations should be done after the national consultations in 6.1.1]	Percentage (%) of women participating in regional and national workshops organized A transboundary and integrated multi-hazard EWS designed taking into account the needs of women and other marginalized groups [Yes/No]	No transboundary EWS in place taking into account the needs of women and other marginalized people; some elements of the EWS in place	Ensure participation of women in regional and national workshops Ensure that the needs of women and other marginalized groups are integrated into the consultations and recommendations and into the design of the transboundary and integrated multi-hazard EWS	At least 30% women participate in regional and national workshops A transboundary and integrated multi-hazard EWS designed taking into account the needs of women and other marginalized groups	Reports of the regional consultation workshops; and lists of participants Document describing the transboundary and integrated multi-hazard EWS
	3.1.2. Launch national consultations in the five countries to gather information and make recommendations on the modes of information and dissemination to the populations (taking into account gender distinctions					

	and their different social roles), including the most vulnerable					
	3.1.3. Collect feedback and make recommendations on the needs for interconnection with transboundary policies and present recommendations to policy makers in the five participating countries [in articulation with 6.1]					
	3.1.4. Revise, update, develop and document process and protocols to monitor flood and drought in local pilot areas, at national and regional scale, as well as to act and make coordinated decisions on the development of alerts, dissemination, and responses					
	3.1.5. Design a transboundary EWS mechanism, including regional guidance and advisories by LCBC, taking into account a community-based approach, as well as the national needs and transboundary policies gathered under Activities 3.2.1 to 3.2.2 [implementation is under Component 5]					
Output 3.2. User needs and requirements understood by NMHSs, public and private sectors	3.2.1 Organize WMO HydroHub User-provider Workshops (involving NMHSs, public and private sectors) at regional level and make detailed analysis of the diverse user groups and associated needs	Percentage (%) of women and other marginalized people participating in WMO Regional HydroHub User-provider Workshops	Limited understanding of the needs of women and other marginalized groups in the basin	Ensure participation of women and other marginalized groups in the WMO Regional HydroHub User-provider Workshops (face-to-face and webinars) Ensure that the needs of women and other marginalized groups are incorporated into the entry points for participation of different user groups	At least 30% women and other marginalized people participate in WMO Regional HydroHub User-provider Workshops Needs of women and other marginalized groups incorporated the analysis and recommendations	Reports of the regional consultation meetings and webinars; and lists of participants Report with the compilation of the information and recommendations
	3.2.2 Produce a compilation of the respective needs and requirements from the exchanges to improve the performance of NMHSs and explore new markets for NMHSs' services	Needs of women and other marginalized groups incorporated the analysis and recommendations [Y/N]				
	3.2.3 Evaluate entry points for participation of different user groups as identified from their capacities, responsibilities, habits for example through partnerships for data collection and sharing, updating or setting up of monitoring networks and user feedback on monitoring and EWS					

	services in terms of quality and usefulness					
	3.2.4 Collectively (providers and users) define recommendations for cooperation and active communication to ensure that services are continuously tailored and improved					
Outcome 3.2. Development of products and services for climate-adaptive and responsive planning and development						
Output 3.3. Climate risk assessed and services/products developed for the basin, including for food security and environmental services	3.3.1 Conduct a detailed Climate Risk Assessment of the Lake Chad Basin, including field studies, to identify vulnerability and exposure to risk factors; and create climate risk registers and catalogs disaggregating data by gender and age categories	Vulnerabilities of women and other marginalized groups incorporated in the Climate Risk Assessment [Y/N]	No Climate Risk Assessment of the Lake Chad Basin taking into account the needs of women and other marginalized people	Ensure that the vulnerabilities of women and other marginalized groups are incorporated in the Climate Risk Assessment Ensure the participation of women in the trainings and workshops	Vulnerabilities of women and other marginalized groups incorporated in the Climate Risk Assessment At least 30% of women (staff) trained	Reports of the national consultation workshops; and reports of the analysis Documents describing the new products and verification results of their application to the Lake Chad Basin Reports of training events; training materials; and lists of participants
	3.3.2 Training on the use and assessment of global and regional numerical weather prediction model outputs (such as quantitative precipitation forecasts), as well as sub-seasonal to seasonal meteorological forecasts, for the Lake Chad basin to help in estimating runoff/ streamflow in S2S scale (feeding into HydroSOS products), and also forecast floods and droughts in the Lake Chad basin in order to improve the LCBC planning	Percentage (%) of women (staff) trained Number (#) of new products developed based on global and regional NWP and taking into account the needs of women and other marginalized people	Limited participation of women in the development and implementation of hydromet methods and tools	At least 3 new products developed based on global and regional NWP taking into account the needs of women and other marginalized groups	At least 3 products developed based on global and regional NWP and taking into account the needs of women and other marginalized people	Monitoring and evaluation reports
	3.3.3 Disseminate information among stakeholders and assess the impacts of climate change and future risks in different sectors (including for food security and environmental services) and to gather feedback for improving products and services					
	3.3.4 Conduct a willingness-to-pay (WTP) survey among stakeholders to gather feedback on most preferred climate-related products and services which could be paid for by policy makers and community dwellers as part of sustainability considerations for DRR and food security [associated with 3.3.3, 5.2.1, 5.2.2, 6.1.2, 6.2.2]					
Output 3.4. Flood and drought	3.4.1 Carry out a detailed analysis of hydrological		Insufficient and inadequate		At least 30% of women (staff) trained	Reports of training events and workshops; training

forecasting tools and EWS within the riparian countries in place and coordination at regional level improved	forecasting tools and EWS (related to floods and droughts) within the participating countries and at the regional level, with a view of determining possible upgrades of the existing systems and mechanisms for a state-of-the-art (impact-based) EWS	Percentage (%) of women (staff) trained Percentage (%) of women (staff) participating in the development and implementation of flood and drought methods and tools	hydrological forecasting tools and systems addressing women and other marginalized people's needs Limited participation of women in the development and implementation of hydromet methods and tools	Ensure the participation of women in the trainings and workshops	At least 30% of women (staff) participating in the development and implementation of flood and drought methods and tools	materials; and lists of participants Monitoring and evaluation reports
	3.4.2 Structure the processes to scale up the use of meteorological and hydrological observation and monitoring methods based on remote sensors (e.g. satellite altimetry, Raincell) applied in Chad, and analyze the feasibility of such methods in pilot areas of Lake Chad [in articulation with 1.1.3]					
	3.4.3 Undertake extreme value analysis for the determination of flood and drought risk thresholds for the various hazard-prone areas of the Lake Chad basin, as well as thresholds based on historical events in consultation with technical services and local representatives					
	3.4.4 Develop a flow forecasting information system for the Lake Chad basin taking into account various available and existing models, and establish a framework for comparison and analysis of information adapted to forecasters and operators					
Output 3.5. A framework for the production and sharing of hydrological status assessments and outlook products in place to inform water resource management	3.5.1 Apply the Global Hydrological Status and Outlook System (HydroSOS) concept, standards and tools, explore the improvement and the development of products based on available Hydromet information (in situ and remotely sensing data), if available local models and downscaling of global models to provide a comprehensive overview of the state of the basin's water resources as well as the hydrological outlook for the coming weeks and months	Percentage (%) of women participating in Regional Hydrological Outlook Forum or similar HydroSOS event Percentage (%) of women (staff) trained	Limited participation of women in the development and implementation of hydromet methods and tools	Ensure the participation of women in the trainings and workshops	At least 30% of women (staff) participating in HydroSOS events and other workshops At least 30% of women (staff) trained	Reports of the regional and national consultation workshops; and lists of participants Reports of the Regional Hydrological Outlook Forums or similar event; and lists of participants Reports of the regional trainings; training materials; and lists of participants

	(seasonal to sub-seasonal time scales)					
	3.5.2 Update/set up a web portal to disseminate the Lake Chad basin related HydroSOS products (at country and regional level and to the HydroSOS global portal) [linked with the Lake Chad Information System (LIS)]					
	3.5.3 Sensitize and train NMHSs, national and regional institutions and research centers on the different uses of Lake Chad Basin water resources information. Produce easy-to-digest (or understandable) bulletins (as outputs of HydroSOS portals) for hydrological status and outlooks based on the user requirements, to assist users and policy makers in decision making					
Component 4. Training of project stakeholders and knowledge development						
Outcome 4.1. Strengthened institutional and human capacities at regional and national levels to operate and maintain the infrastructure and tools made available through the project						
Output 4.1. Organizational arrangements at a national and regional levels and development plans prepared and implemented	4.1.1 Undertake an assessment of existing operating procedures and human resources capacities for Hydromet monitoring and data management making use of the WMO HydroHub Capacity and Needs Assessment; and in collaboration with all relevant stakeholders, develop recommendations and a proposal for an organizational reform strategy with an action plan to enhance institutional arrangements in the five countries of the Lake Chad basin	Percentage (%) of women (staff) participating in the development of the organizational reform strategy, training programs and action plans Needs of women and other marginalized groups incorporated in the training programme and action plan [Y/N]	No assessment of the human resources capacities in the 5 countries and at LCBC No capacity development strategy in the 5 countries and at LCBC	Ensure the participation of women (staff) in the development of the organizational reform strategy, training programs and action plans Ensure that the needs of women and other marginalized groups are incorporated in the training programme and action plan	At least 30% of women (staff) participating in the development of the organizational reform strategy, training programs and action plans Needs of women and other marginalized groups are incorporated in the training programme and action plan	Reports of meetings; lists of participants Training programme and action plan
	4.1.2 Develop a needs-based training programme and action plan for staff from national and regional institutions and deliver tailored training for the development of project activities					
Output 4.2. Hydromet staff is trained in monitoring, information systems and service delivery	4.2.1 Train/reskill relevant NMHSs and LCBC staff in installation, maintenance and management of monitoring stations, including quality assurance, quality control aspects, data transmission and	Percentage (%) women (staff) participating in trainings and workshops related to operation and maintenance, and	Limited participation of women in maintenance and operation of stations, and data management	Ensure participation of women (staff) in trainings and workshops related to operation and maintenance, and data management systems	At least 30% women (staff) participating in trainings and workshops related to operation and maintenance, and data management systems	Training session reports, list of participants and training materials Surveys/tests at the beginning and at the end of the training sessions

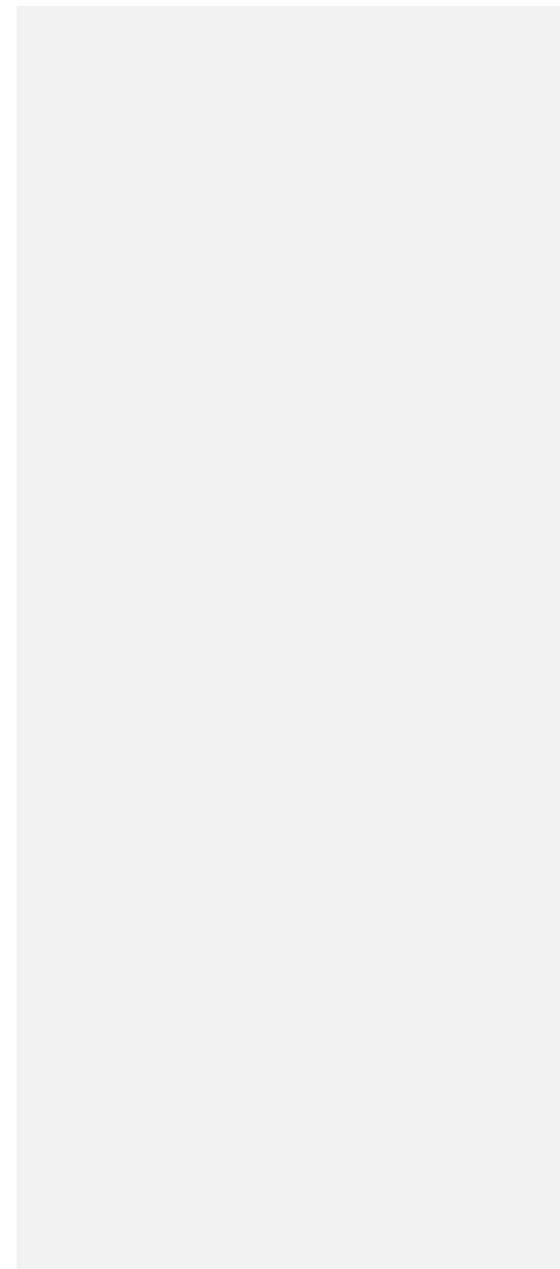
(with gender disaggregation)	maintenance of equipment according to WMO standards and safety	data management systems	activities (baseline to be determined at the inception phase from existing reports of past trainings)			
	4.2.2 Train/reskill LCBC and NHMSs' staff in data management and information systems made available, including strengthening/development of hydrological information products and mechanisms for data and metadata interoperability in LCBC and NMHSs					
	4.2.3 Reskill monitoring station observers and train them in the operation and maintenance of new generation hydrometeorological equipment, prevention of vandalism and in the importance of sustaining observations					
Component 5. Awareness raising with decision makers, lawmakers and water users on the importance of hydrometeorological information and services (Communication and timely diffusion of appropriate product and services to end users)						
Outcome 5.1. Enhanced communication and awareness programmes on Hydromet and early warning systems						
Output 5.1. Awareness raised for decision makers, lawmakers and water users and strategy for stakeholders' engagement developed (with gender disaggregation)	5.1.1 Organize awareness-raising activities for decision-makers, legislators and water users, including through the WMO HydroHub Ministerial Roundtables. Dialogues organized in the last year of the project's development should, as far as possible, use the benefits of the project's activities as an illustration (showcase cost-benefits and added value of Hydromet services)	Percentage (%) of women participating in WMO HydroHub Ministerial Roundtables [or LCBC Heads of Summit or other high-level event] for awareness raising Gender-responsive stakeholders engagement strategy and action plan at regional and national levels [Yes/No]	No gender-responsive stakeholder engagement strategy	Ensure participation of women HydroHub Ministerial Roundtables [or LCBC Heads of Summit or other high-level event] for awareness raising Develop and support implementation of a gender-responsive stakeholder engagement strategy	At least 50% of women participating in HydroHub Ministerial Roundtables [or LCBC Heads of Summit or other high-level event] for awareness raising Gender-responsive stakeholder engagement strategy developed At least 75% implementation of the stakeholder engagement strategy and action plan; and support provided to institutionalize the process	Consultation meeting reports; and lists of participants Reports of the WMO HydroHub Ministerial Roundtables; and lists of participants Gender-responsive stakeholder engagement strategy and action plan
	5.1.2 Develop a gender-responsive stakeholder engagement strategy and action plan for continuous engagements with key stakeholders, including Civil Society Organizations (CSOs), private sector, government departments and local community representatives	% of implementation of the stakeholder engagement strategy and action plan				
	5.1.3 Implement the stakeholder engagement strategy and action plan (developed under Activity 5.1.2) and support institutionalization of the					

	process to ensure continued engagement beyond project implementation						
Output 5.2. User feedback mechanism institutionalized through a collaborative framework for continuous dialogue and understanding evolving needs and feedback mechanisms across the value cycle for improvement of hydrological products and services	5.2.1 In close co-operation with users, develop appropriate user feedback mechanisms and identify novel and user-friendly channels that allow continuous feedback and engagement from all users of hydrometeorological services	Percentage (%) of women and other marginalized groups participating in user feedback mechanism Dedicated channel for gathering feedback and engagement of women and other marginalized groups [Yes/No]	No feedback mechanism in place	Ensure participation of women and other marginalized groups in the feedback mechanism Establish a dedicated channel for gathering feedback and engagement of women and other marginalized groups	At least 50% of women and other marginalized groups participating in the feedback mechanism (i.e. providing feedback) A dedicated channel for gathering feedback and engagement of women and other marginalized groups established	User feedback survey for call interviews; and lists of participants Dedicated channel for gathering feedback and engagement of women and other marginalized groups Reports of the analysis of the results of the feedback provided by users; and lists of participants	
	5.2.2 Implement and support the institutionalization of the user feedback mechanisms to ensure continued improvement of hydrometeorological products and services						
Outcome 5.2. Enhanced preparedness and response capability to act upon warning and risk information to minimize impact of hydromet disasters on lives, livelihoods and socio-economic systems							
Output 5.3. A communication and warning dissemination system set up, operational and accessible to a wide audience, including vulnerable people (taking into account needs of marginalized groups; Gender disaggregated)	5.3.1 Following the design prepared under Component 3, implement at LCBC a hydro-meteorological information system that would provide regional guidance and advisories based on data regularly received at regional level from the stations to <u>updating the regional database</u>	LCBC regional guidance and advisories issued regularly and disseminated on a dedicated web-based system taking into account women and other marginalized groups' needs [Yes/No] Learning and communication materials developed taking into account women and other marginalized groups' needs [Yes / No] Methodological guidance developed for upscaling of community contingency planning in the countries taking into account women and other	No LCBC regional guidance and advisories No communication materials taking into account women and other marginalized groups' needs Limited capacity of women and other marginalized groups trained and capable to act upon warning and risk information	Assess the needs of women and other marginalized groups for regional guidance and advisories Develop and implement LCBC regional guidance and advisories taking into account women and other marginalized groups' needs Develop learning and communication materials taking into account women and other marginalized groups' needs Ensure that needs of women and other marginalized groups are taken into account into the methodological guidance developed for upscaling of community contingency planning Ensure participation of women and other marginalized groups in trainings and workshops	Needs of women and other marginalized groups for regional guidance and advisories assessed LCBC regional guidance and advisories issued regularly and disseminated on a dedicated web-based system taking into account women and other marginalized groups' needs Learning and communication materials taking into account women and other marginalized groups' needs developed Methodological guidance developed for upscaling of community contingency planning in the countries taking into account women and other marginalized groups' needs	Monitoring and evaluation report Learning and communication materials Reports of workshops and training events Methodological guidance developed	
	5.3.2 Develop learning and communication materials (including in local languages) for practitioners, policy makers, parliamentarians, women and youth, including videos, websites, brochures, radio announcements etc., in collaboration with national agencies.						
	5.3.3 Organize upscaling of contingency planning at community level, building on the experience in the pilot communities [in articulation with 6.1]						

		marginalized groups' needs [Yes / No]				
Output 5.4. Inclusive warning messages accessed, received, understood and trusted by user communities in the Lake Chad basin (taking into account the needs of marginalized groups; Gender disaggregated)	5.4.1 Engage communities to develop, test and evaluate last-mile arrangements to ensure that warnings and advisories are understandable and actionable for the most vulnerable populations (including women, children and the elderly)	Needs of women and other marginalized groups in relation to last mile arrangements assessed [Yes / No]	Lack of tailored warning messages that are accessed, received, understood and trusted by user women and other marginalized groups in the communities	Assess the needs of women and other marginalized groups in relation to last mile arrangements Develop warning message templates that address the needs of women and other marginalized groups Develop community contingency plans taking into account the needs of women and other marginalized groups Ensure participation of women and other marginalized groups in trainings and workshops	Needs of women and other marginalized groups in relation to last mile arrangements assessed Warning message templates that address the needs of women and other marginalized groups developed 1 community contingency plan in each pilot community developed taking into account the needs of women and other marginalized groups At least 50% of women and other marginalized groups participating in workshops and trainings	Consultation meeting reports; and lists of participants Reports of workshops and training sessions and training materials; lists of participants Monitoring and evaluation report Quarterly reports of the NGOs that support the local activities
	5.4.2 Organize the development of community contingency plans that are inclusive and gender responsive in pilot communities and support to bring them into service	Warning message templates that address the needs of women and other marginalized groups developed [Yes / No]				
	5.4.3 Organize meetings and training sessions for the population in the pilot sites in the five countries on the interpretation of information disseminated through official channels that are part of the inclusive early warning system (designed under Component 3), ensuring equal participation of men and women, and share lesson learned.	1 community contingency plan in each pilot community developed taking into account the needs of women and other marginalized groups [Yes / No] Percentage (%) of men, women, elderly, youths, and disabled people participating in workshops and trainings				
Component 6. Plans and communities' response capacity						
Outcome 6.1. Enhanced governance mechanisms at the basin level and increased adaptive capacity within the agricultural and natural resource sectors as well as disaster risk management	Number (#) of regional and national policies, plans, strategies, and laws adopted influenced which integrate flood and drought management and climate resilience Community-led and gender-responsive risk mitigation and climate resilience plans [Yes/No]	Insufficient integration of flood and drought management and climate resilience in policies, plans, strategies and laws Lack of community-led and gender-responsive risk mitigation and climate resilience plans	At least 5 regional and national policies, plans, strategies, and laws adopted, influenced for flood and drought management and climate resilience At least 5 community-led and gender-responsive strategies and plans for risk mitigation and climate resilience developed and implemented			Consultation meeting reports; training session reports and materials; and lists of participants Monitoring and evaluation report

Output 6.1. Plans, policies, strategies for integrated flood and drought management, risk mitigation and climate resilience at regional, basin and national levels	6.1.1 Organize and conduct national workshops to identify gaps and needs in policies and plans, and to highlight and make recommendations for key long-term strategies for integrated flood and drought management	Needs of women and other marginalized groups taken into account in the assessment of policies and plans and recommendations [Yes/No]	Lack of gender mainstreaming in integrated flood and drought management and climate resilience policies, plans, strategies and laws	Take into account the needs of women and other marginalized groups in the assessment of policies and plans and recommendations Develop gender responsive basin level flood and drought management plans	Needs of women and other marginalized groups taken into account in the assessment of policies and plans and recommendations Gender responsive basin level flood and drought management plans developed At least 1 training session on Gender Mainstreaming per country (with at least 50% women) At least 30% women participating in consultations and training sessions	Consultation meeting reports; and lists of participants Training reports and materials; and lists of participants Flood and drought management plans Monitoring and evaluation report
	6.1.2 Based on the detailed Climate Risk Assessment developed in 3.1.1, and in conjunction with the relevant stakeholders, develop a gender-responsive basin-level drought management plan and flood management plan	Gender responsive basin level flood and drought management plans developed [Yes/No]		Conduct training sessions on Gender Mainstreaming in each country Ensure participation of women in consultations and training sessions		
	6.1.3 Support the institutionalization of the flood and drought management plans in major institutions in the Lake Chad Basin	Number (#) of training sessions on Gender Mainstreaming				
	6.1.4 Organize and conduct workshops (at least one per country) on the Training Manual for Gender Mainstreaming in Flood and Drought Risk Forecasting and Management with participants from NMHSs, local decision makers, civil authorities, women and community organizations, etc.	Percentage (%) of women participating in consultations and training sessions				
	6.1.5 Develop policy briefs and support integration of flood and drought management and climate resilience in policies, plans, strategies, and laws					
Output 6.2. Medium and long-term adaptation and mitigation measures recommended in the pilot vulnerable areas (taking into account Gender, youth and disabled people needs)	6.2.1 Develop a national roadmap or action plan for the establishment of community-led risk mitigation and climate resilience plans, including the selection of priority catchments/communities including gender, youth and other social criteria as critical to determine vulnerability for pilot implementation under this proposed project	National roadmap or action plan for the establishment of community-led risk mitigation and climate resilience plans taking into account women and other marginalized groups' needs [Yes / No]	Limited community-led and gender responsive risk mitigation and climate resilience plans	Develop a national roadmap / action plan for the establishment of community-led risk mitigation and climate resilience plans taking into account women and other marginalized groups' needs Develop community-led and gender responsive risk mitigation and climate resilience plans for the pilot communities Ensure participation of women and other marginalized groups in trainings and workshops	National roadmap or action plan for the establishment of community-led risk mitigation and climate resilience plans taking into account women and other marginalized groups' needs Community-led and gender responsive risk mitigation and climate resilience plans in the pilot communities developed At least 50% of women and other	Roadmap / action plan for the establishment of community-led risk mitigation and climate resilience plans Consultation meetings and training reports; and lists of participants Monitoring and evaluation report Quarterly reports of the NGOs that support the development and implementation of the plans
	6.2.2 Cost potential community level risk mitigation and climate resilience measures in the Lake Chad Basin and identify potential sustainable financing strategies	Community-led and gender responsive risk mitigation and climate resilience plans developed for the pilot				
	6.2.3 In priority selected catchments, develop and					

	implement community-led and gender responsive risk mitigation and climate resilience plans	communities [Yes/No] Percentage (%) of men, women, elderly, youths, and disabled people participating in workshops and trainings			marginalized groups participating in workshops and trainings at community level	
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ANNEX 5 – REGIONAL WORKSHOP REPORT (MARCH 2023)

1. INTRODUCTION

The second regional stakeholder workshop for the development of the full project proposal “**Integrated water resources management and early warning system for climate change resilience in the Lake Chad Basin**”, to be submitted to the Adaptation Fund (AF), was held in N'Djamena, Chad from 29 to 31 March 2023. This workshop was organized in a hybrid format (online and face-to-face), and counted with 65 participants (15% women and 85% men), of whom 49 were present in N'Djamena and 16 online. Simultaneous interpretation was provided in English and French. Full report in English and French available [here](#).

The main purpose of the workshop was to validate the full project proposal, by collecting comments from stakeholders in the participating countries, including key beneficiaries such as National Hydrological and Meteorological Services (NHMSs), Disaster Management Organizations (DMOs), regional institutions, non-governmental organizations (NGOs) and local communities in the Lake Chad basin. More specifically, the workshop aimed to agree on the content of the project proposal, addressing the following main points:

- Bring together relevant national and regional stakeholders to present and discuss the fully developed project proposal, its objectives, deliverables and implementation plan focusing on ownership and sustainability of the achievements;
- Clarify the roles and responsibilities of the different national and regional partners involved in the development and implementation of the project;
- Solicit input from and facilitate dialogue among stakeholders in meteorological, hydrological and climate services, including opportunities for synergies with initiatives already underway or planned in the participating countries and at the regional level;
- Understand the perspectives and needs at the community level for the development of the products and services in the context of the project activities;
- Encourage high-level commitment and leadership to develop partnerships to support project ownership and joint implementation of activities for sustainable results.

The main articulations and outcomes of the workshop are presented below.

2. OFFICIAL OPENING

The opening ceremony of the workshop was marked by six main speeches (all done in person):

- Opening remarks by the Chad Focal Point to the LCBC
- Opening remarks by the WMO Regional Hydrological Advisor for the African Region
- Opening remarks by the WMO Representative
- Opening remarks by the Permanent Representative of Chad to WMO
- Opening remarks by the Executive Secretary of the Global Water Partnership-Central Africa (GWP-CAF)
- Opening remarks by the representative of the Executive Secretary of the LCBC

3. INTRODUCTION OF PARTICIPANTS AND ADOPTION OF THE AGENDA

The protocol ceremony of the opening of the Workshop was followed by the presentation of the participants (present and online).

Five participants from each country were expected to participate in person. Those from Central African Republic (CAR), Niger, Chad and Nigeria were all present, while Cameroon was represented by 4 participants, as the Director of Meteorology was unable to attend in person. However, he was able to fully participate remotely in the workshop. The lead consultant of the project, Ms Alice Soares, was also unable to attend. The second consultant, Mr Daniel Sighomnou, was present, as well as the GWP-CAF representative, Mr Djibrilla Mohamadou, the project manager from the WMO Secretariat, Ms Johanna Korhonen, and the Head of the WMO Regional Office for West, Central and North Africa, Mr Bernard Gomez. Also present were 21 representatives of the LCBC, including the Technical Director, Mr Hycinth Banskeka, making a total of 49 face-to-face participants, 14% of whom were women and 86% men.

There were 16 online participants, distributed as follows: GWP (01), WMO (04), NMS Cameroon (01), NiMet Nigeria (02) and 08 people from Civil Society Organizations (CSOs). These participants were composed of 19% women and 81% men.

The work began with the establishment of the workshop bureau, with Chad as chair on the first day, Nigeria on the second day and Cameroon on the third day. Daily reporting was done by the countries and a team from the LCBC. The overall report was prepared by the LCBC team in collaboration with Mr Daniel Sighomnou, WMO consultant.

4. PRESENTATIONS

The workshop was marked by 7 presentations, 3 on the first day, 2 on the second and 2 on the third day.

4.1 Objectives, expected results and deliverables of the workshop

The first presentation was made by Mr. Alio Abdoulaye, Head of the Lake Chad Basin Observatory Division. It focused on the context, expected results, products and deliverables of the workshop. The main expected outcome of the workshop is a preliminary approval of the fully developed project proposal by the member countries and stakeholders. In this respect, particular attention should be given to the products and services associated with the development of the project activities, both during and after the implementation period of the field activities.

More specifically, the main expected outcomes of the workshop are:

- Comments on the project proposal, including the environmental and social impact assessment, as well as the gender assessment.
- Initial discussions on the modalities for the implementation of the project activities, including the roles and responsibilities of the partners involved;
- Verification of the project's baseline and assumptions;
- The update of potential synergies and complementarities with other relevant projects at the LCBC and in the Lake Chad Basin countries;
- The contributions of the different stakeholders to the mechanisms to ensure the sustainability of the project investments;
- The commitment and ownership of the project by member countries.

The presentation was followed by exchanges which mainly focused on requests for clarification. Particularly, it was recalled that the development of the process cannot take place, at any level, without the support and close collaboration of the countries concerned.

4.2 Development process and status of project preparation

The second presentation was given by Ms Johanna Korhonen, project manager at the WMO Secretariat. She recalled the history of the project development process, and the different steps already taken in the preparation process of the full project proposal, based on the template provided by the AF. The principles of the new generation of hydrometeorological monitoring projects, including those of the new strategy of the WMO WHYCOS (World Hydrological Cycle Observing System) programme, were also recalled, as well as the role of the different stakeholders in the project. Particular emphasis was placed on the fundamental role of the countries, whose support was critical for the development of the project proposal. In particular, it was stressed that participating countries must take ownership of the project and ensure the sustainability of its achievements after the end of external funding.

The presentation was followed by exchanges that focused mainly on clarifications, the question of the sustainability of the project's achievements, and the participation of communities in the implementation of activities. Appropriate answers were given to these different concerns. It was also recalled that some of these questions would be answered in the presentations that follow.

4.3 Full project proposal document: objective, components, outputs, key activities.

The third presentation by Mr Daniel Sighomnou concerned the full project proposal. After recalling the basic data and the context of the project development, the main articulations of the presentation concerned the specific objectives of the project as well as its components, the key activities, the budget and the implementation modalities including the particular role of the national technical services (notably NMHSs and Civil Security), NGOs and local communities, expected results, the contribution of Adaptation Fund financing against the baseline, including in particular the improvement of monitoring systems and adaptation strategies as well as preparedness, awareness of best practices and behavioral change of populations, policy makers and communities. He also emphasized the need for raising awareness among decision-makers and beneficiary communities, including the youth and women, who should not only contribute to the design, but also take ownership of the project from the

beginning of the development process. Emphasis was also given on the sustainability of the project's achievements and the development of synergies with other ongoing or planned projects and programmes with similar or complementary objectives.

The presentation was followed by exchanges which mainly focused on clarifications, notably on the modalities of the states' contribution to the financing of the project's activities, the identification of the beneficiaries and their specific needs, the taking into account of gender in the development of the activities, the sharing of data, the sustainability of the project's achievements, the management mechanism, the taking into account of the existing and planned facilities in the setting up of the monitoring network. The countries particularly insisted on the need for ownership of the project by the technical services concerned and their close contribution to the implementation of all activities on the ground to ensure the sustainability of the results.

Appropriate responses were given to these various concerns. In particular, it was recalled the fundamental role of the States' technical services in the implementation of field activities, including the installation, and rehabilitation and monitoring of the observation stations of the project network. The question of the financial contribution of the countries to the implementation of the activities and its importance for the sustainability of Hydromet monitoring was also clarified. It was specified that it will be done in proportion to the number of monitoring stations of the project network in the country and only concerns the operating costs. Further clarifications would be made later in the process, especially when the implementation of the project's activities in the field be launched. However, those responsible for the technical services concerned in the countries, notably the NMHSs, should take this into account and start thinking about the modalities of their implementation. As regards gender issues, environmental impacts and synergy with other projects, it was recalled that these are priorities for the AF and that their consideration is also a priority for all project stakeholders. The countries are called upon to contribute to this, especially when designating participants in the work and meetings organized within the framework of the project, and to provide the information available at their level, notably on the relevant existing or planned projects in their national portion of the basin.

4.4 Other relevant existing or planned initiatives in the region related to this project

The fourth presentation of the workshop was made by Mr. Alio Abdoulaye, on other relevant existing or planned initiatives in the region. Several initiatives with complementary objectives are underway or planned in the region and/or in the Lake Chad Basin, with the support of technical and financial partners such as the World Bank, the United Nations Development Programme (UNDP), the African Development Bank (AfDB) and other development partners such as the United Nations Educational, Scientific and Cultural Organization (UNESCO), German cooperation (GIZ and BMZ), the French Development Agency (AFD), as well as funding initiatives such as the Climate Risk and Early Warning Systems (CREWS), the Global Environment Facility (GEF), etc. These projects include the acquisition of equipment and the installation of stations that will be capitalized on by this project, in particular the Emergency Flood Control Project (PULCI), under which hydrological and meteorological stations have recently been installed. These installations will be used in the framework of the present project, as well as those planned in the framework of the PRESIBALT (Programme de réhabilitation et de renforcement de la résilience des systèmes socio-écologiques du bassin du lac Tchad) and GEF-UNDP projects for which equipment recently acquired and delivered to the countries will allow the instrumenting of several hydrometric, meteorological and groundwater monitoring stations. The results of a study being carried out by the World Bank under its International Cooperation for Water in Africa (CIWA) programme will also make it possible to refine or refocus certain activities planned under the present project.

Participants also mentioned the existence of the Projet d'Aménagement et de Valorisation des Investissements de la Vallée du Logone (VIVA Logone) in Northern Cameroon. Synergies would also be developed with this project during the implementation of the project activities.

The presentation was followed by questions of clarification. In particular, it was recalled that further clarifications would be provided on the synergies to be developed after the launching of the project activities, including field visits which would allow, for example, to have a precise idea of the real state of the stations and equipment in place, but also after closer exchanges with the persons in charge of some of the projects concerned.

4.5 Environmental and social impact assessment, gender assessment and gender action plans

Each project financed by the Adaptation Fund (AF) requires carrying out environmental impact assessments (EIA) and social impact assessments (SIA) in accordance with the Fund's environmental and social policy, as well as a gender assessment and action plan, in accordance with the AF gender policy. Consultants dealing with these

subjects were engaged to carry out the said studies and the result of their work was presented to the workshop participants by Mr Daniel Sighomnou.

The presentation focused on the following main points: the outcome of the initial gender assessment, the selection of gender indicators and the design of gender-sensitive implementation and monitoring modalities for the project; the compliance of the project proposals with the Gender Equality Policy (GEP) and its considerations on gender equality and women's empowerment risks. It also covered the compliance of the project activities with the Adaptation Fund's Environmental and Social Policy (ESP) and its 15 principles; the consultation with pilot communities in the countries; the main environmental and social issues encountered in the Lake Chad Basin; the environmental and social risk management plan that can be activated to manage risks and/or impacts that cannot be avoided, during the implementation of the project activities, among others.

The presentation was followed by questions and comments on the outcome of the consultants' work. Concerns were expressed that the analyses may have remained too general without going into sufficient depth, and that they did not meet the countries' expectations regarding the regulatory content of impact studies. However, it emerged from the subsequent discussions that, once considered in their entirety by the workshop participants, the reports attached to the proposal generally meet the expectations in relation to the requirements of the Adaptation Fund and the specificities of the project. In particular, it was noted that the Adaptation Fund's expectations for environmental and social impact assessments are distinct from the impact assessments required by country national regulations, and that the project activities should not require conduct of a regulatory impact assessment. However, the necessary environmental permits will be sought as part of the project implementation, should they prove necessary.

4.6 Ownership and sustainability of the project

The sixth presentation on the issues of ownership and sustainability of the project was again made by Mr Alio Abdoulaye. It covered all aspects of sustainability required by the AF, including environmental, social, institutional, technological, economic and financial sustainability. In particular, it was emphasized that the project benefits from feedback from other projects with similar objectives, developed in other basins in the region and from other WMO initiatives, including the new WHYCOS strategy which places particular emphasis on technological sustainability. The project also foresees, as part of Component 1, an analysis of the organizational and institutional framework of NMHSs, including the existing legal basis, funding and partnership arrangements. The sustainable management strategy that will be proposed as a result of this analysis would contribute to the strengthening of the institutional sustainability of the project. With regard to the sustainability of the other achievements of the project, it was stressed that the priorities of the States and the needs of the water users in the basin were taken into account in a participatory approach in the project development process. The project also foresees a progressive participation of the countries in the financing of the activities which would contribute, for example, to ensure the continuation of the development of the Hydromet monitoring activities at the end of the external financing.

4.7 Next steps in the preparation of the full project proposal, approvals and submission schedule

The seventh and final presentation on the next steps in the process was given by Ms Johanna Korhonen. After recalling the previous steps in the process, the remaining steps to be taken before the submission of the document to the AF were presented. They concern the finalization of the project document, based on the results of the workshop and the feedback from the countries, the receipt of the endorsement letters and approval for the implementation of the WMO-HydroHub calls for innovation by the WMO within the framework of the project, signed by the designated authorities (DAs) of the AF in the participating countries. It is recalled that the date of submission of the project document is yet to be specified but is expected to be between the end of April and the beginning of May 2023. Under these conditions, the DAs are requested to send their letters of approval as soon as possible after the receipt of the final document to allow a timely submission.

5. GROUP WORK

The group work was organized with the aim of gathering the participants' views on the project proposal with a view to full ownership by the countries and stakeholders in the preparation of the project. They also served to highlight aspects that may not yet have been taken into account in the proposal. They also provided an opportunity for stakeholders to express their views in order to ensure a sustainable basis and explicit stakeholder commitment for the project.

The work was organized in four sessions, three of six groups (five groups each with participants from the same country and one online group) and one of four groups (three face-to-face groups with members selected from the attendance list, and one online group). Partners from the LCBC, GWP-Caf, WMO and the Consultant were called upon by the different groups to provide clarifications and explanations on certain issues when necessary.

The first session focused on collecting general comments on the project. The second session focused on the role of the different partners in the implementation of the project activities, as well as on the risks/mitigation proposed in the project document. The third working session focused on the Environmental and Social Impact Assessment (ESIA) report, the gender study report and the action plan. Participants were divided by country (to ensure that the information gathered was consistent with country realities and needs). There were also questions related to the gender study. The final group session focused on issues of ownership and sustainability of the project's achievements.

5.1 Group work results

The tables of group work results are presented below. The key points to be taken into account in the finalization of the project document, and/or later in the development of the project activities, include the following issues:

- 1- All participants were unanimous in recognizing that the project proposal, its approach and activities adequately address the needs of the countries and reflect well the discussions that took place during the consultations. They also recognized that the baseline described in the proposal reflects the reality in the different participating countries and that the targeted achievements are appropriate and realistic, but it was stressed that a community-based approach needs to be taken into account in the design and implementation of the early warning systems, foreseen under components 3 and 5 of the proposed project. This should be reflected in part 2, section A. of the project proposal.;
- 2- The need to involve national NGOs, local authorities, local institutions and users such as agricultural companies, civil society organizations, and local communities in the development of project activities, including data collection in the field. These aspects should be reflected in Part 3, Section A. of the project proposal;
- 3- Among the topics that participants would like to see addressed in more detail in Part 2, Section A of the project proposal, are the issues of insecurity, synergy of action between the hydrological and meteorological services of the participating countries, and the timetable for the implementation of activities;
- 4- The participants also recognized the need to sensitize communities, administrative, traditional and military authorities at regional and intranational levels on the importance of Hydromet monitoring on socio-economic development as well as the need for their participation in the maintenance of the equipment to be much more reinforced. A number of project activities address these issues, which are well reflected in the project proposal, Part 2, Section A. However, efforts need to be made during the implementation of the project to ensure that these activities achieve the expected result;
- 5- The participants also unanimously recognized that the proposed modalities for the implementation of the project activities are well adapted in the project proposal, but recalled that the close collaboration of the countries in the implementation of the activities on the ground is essential to ensure the sustainability of the achievements;
- 6- The establishment of a Project Management Unit at national level is recommended and should be reflected in the project proposal, part 3, section A.;
- 7- The practice of selling data claimed by some national technical services, which is detrimental to the free sharing of data, including with the LCBC, deserves special attention during the implementation of the project;
- 8- The lack of human resources and the delay in mobilizing internal financial resources are cited as additional risks that should be taken into account in the project proposal, part 3, section B. ;
- 9- The issue of the low involvement of women, especially at the institutional level, deserves special attention during the implementation of the project;
- 10- The main environmental and social risks concern the installation of hydrometeorological stations, including land issues and the use of batteries in the stations. These are well taken into account in the project proposal, but efforts must be made during project implementation to ensure that the proposed mitigation measures are applied;
- 11- The need to involve Ministry of Finance officials in the project Steering Committee to promote/support the commitment of the States to support the activities after the end of the project funding, including the maintenance and monitoring of the Hydromet stations. This should be reflected in the project proposal, part 3, section A;

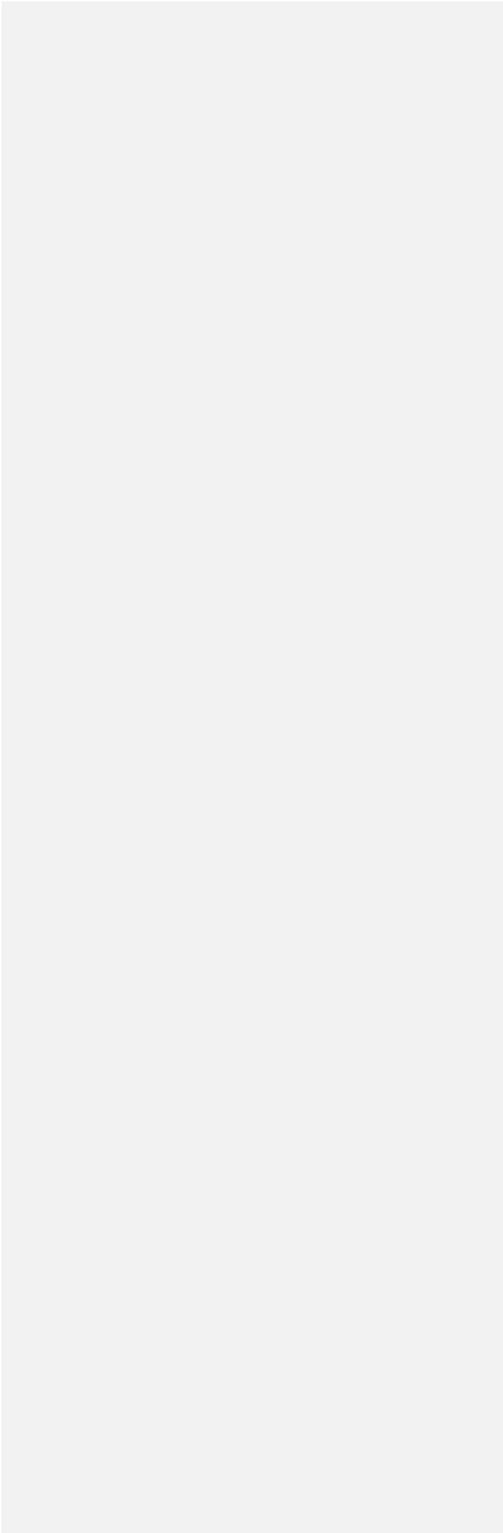


TABLE OF GROUP WORK RESULTS

Session 1: General comments on the project proposal

1. Does the proposal, its approach and activities meet the needs of your countries and reflect the discussions that took place during the consultations?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
<p>- The proposal, its approach and activities respond to the needs of our country and reflect the discussions that took place during the consultations</p> <p>Component 6: Difficulties in accessing community information (dissemination channels)</p> <p>- The activities respond to the needs and discussions during the consultation.</p>	<p>Yes, the content as a whole is in line with our needs on the ground and it contributes to the achievement of our different national strategies on environmental and water resources management issues. Stakeholders (sectoral administrations, CSOs etc) are taken into account</p>	<p>Yes, the main points discussed have been taken into account and all activities as presented by the consultant in the document meet our needs</p>	<p>Yes, with some modifications taking into account the population and size of LCBC in Nigeria, as indicated in the responses below.</p>	<p>YES: The proposal, approach and activities are in line with the needs expressed in the prior consultations</p>	<p>They effectively respond to the realities of the countries' needs given that the area concerned has many water-related problems (lack of access to drinking water, flood damage), and a community-based approach to setting up warning systems is best suited.</p>

2. Could you tell which activities met your needs?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
<p>- Rehabilitation and upgrading of old stations and installation of new ones in synergy with other ongoing or planned projects;</p> <p>- Develop/strengthen a regional database management system according to WMO guidelines to meet the needs of all users...)</p>	<p>Capacity building, awareness raising, taking into account the preservation of the environment, improving knowledge, strengthening and modernizing existing equipment</p>	<p>- All activities as presented by the consultant in the document meet our needs</p>	<p>Strengthening the capacity of hydrometric stations strengthening synergies between member countries (data sharing), gender mainstreaming</p>	<p>- All the activities of the proposed components meet the needs of the CAR</p>	<p>Strengthening the hydrological and meteorological infrastructure</p> <p>This will enable the services in question to play their role effectively in the warning system</p>

3. Does the baseline reflect the reality of your country and are the targeted achievements appropriate and realistic?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
<p>The baseline reflects well the state of operation of the hydrometeorological service and observation network. The target achievements are appropriate and realistic.</p>	<p>Yes, a survey has been carried out</p>	<p>Yes, the baseline reflects our reality and the achievements are appropriate and realistic</p>	<p>We observed that the social environmental assessment does not reflect the majority of vulnerable groups in the project area. The deliverables are appropriate and realistic</p>	<p>Yes</p> <p>- The baseline reflects the reality of the CAR, and</p> <p>- Target achievements are appropriate, realistic and achievable</p>	<p>The reference level reflects reality because the Hydromet report, which is the report done by the Economic Community of Central African States (ECAC), was used and this made it possible to have a reference level close to reality and there were also exchanges with the national services in the case of Cameroon. It should also be mentioned that this is a consensus achievement in terms of its set-up phase and it is one of the few projects that involved consensus and strong participation of different stakeholders</p>

4. What concerns do you have for the implementation of the project?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
The creation of a project coordination unit at national level is necessary.	<p>Prioritize sensitive and cross-border sites with regard to the means available</p> <ul style="list-style-type: none"> - Effective consideration of community resilience plans and the means to implement them - Better involvement of the Decentralized Territorial Authorities (DTCs) - Taking charge of the observers responsible for hydrological and meteorological monitoring <p>Establish collaboration with existing structures in the project area (MIDIMA (The Mandara Mountains Integrated Development Mission), SEMRY (Society for the Expansion and Modernization of Rice Growing in YAGOUA), SODECOTON (Cameroon Cotton Development Company), University of Maroua-antenna of Kousseri)</p>	<ul style="list-style-type: none"> - Sustainability of activities - Training/capacity building - Timely provision of material and financial resources - Problem of insecurity in some parts of the country 	<p>Roles and responsibilities for the specific needs of the country are not well defined for the implementation of the project.</p> <p>Data collection and processing will be carried out by NIMET and NIHSA in collaboration with the federal states.</p>	<ul style="list-style-type: none"> - Raising awareness of the administrative and local authorities and the population on the start of the project activities in order to improve ownership; - Capacity building of sectoral actors involved in the implementation of the project 	In addition to the involvement of national services in the implementation, it is necessary to think of widening the field of actors so that it is sufficiently open to national NGOs, CSOs and communities

A. What topics would you like to discuss in more detail in this workshop in the coming days?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
<ul style="list-style-type: none"> - Communication of the final products to the communities; - Synergy of action between meteorology and hydrology. 	<ul style="list-style-type: none"> -Hydro-meteorological and piezometric infrastructures; -Water quality -Specify the role of the different partners involved 	<ul style="list-style-type: none"> - Problem of insecurity - Involvement of women, youth and local elected officials - Development of synergies and sustaining of successful experiences from other projects - Distribution by structure and installation of hydrometeorological instruments 	<p>The specific cost of collecting, monitoring and maintaining the stations should be as elaborate as possible.</p> <p>Effective communication to ensure ownership and sustainability of the project</p>	<p>Organization of regional and national IWRM, EWS – RCC/CBL project launch workshops:</p> <ul style="list-style-type: none"> - Presentation/ information sharing on the project to all stakeholders - Understanding of the Adaptation Fund sustaining mechanism 	<p>The stages of implementation, because the launch must be well calibrated and better structured so that the timetable cannot overlap due to possible delays in the launch.</p> <p>At the end of the workshop, an implementation timetable must be established</p>

B. Is any relevant information missing (in general) or incorrect?

Chad	Cameroon	Niger	Nigeria	CAR	On-line participants
Data is not free within the weather services.	Analysis of risks that could prevent the implementation of the project (cross-border insecurity, conflicts between farmers and herders etc)	<ul style="list-style-type: none"> - Develop the hydrometeorological part in the document - State of knowledge of the hydrometeorological network and hydraulic infrastructures in the Lake Chad Basin, especially on rivers - State of knowledge of products and services already provided in member countries 	We need to know the minimum density of hydrometeorological stations required by the WMO. For this project, we need to know the number of Hydromet stations allocated to Nigeria to enable us to develop a project plan.	The EWS process should not be exclusively dedicated to civil protection but rather to all stakeholders in the system	The project needs to be able to go deeper into the aspects of contingency and sustainable resilience. This is to ensure that everything will be in place so that at the end of the project the beneficiaries of its actions can effectively ensure continuity and sustainability to avoid that at the end of the project, all its investments and actions cannot continue in a sustainable manner.

Session 2: Various questions on different parts of the project document

1. Do you think that the implementation methods used by the partners+ (steering committee, technical committees) are appropriate?

Group 1	Group 2	Group 3	Group 4 (online)
- Yes, we think it is appropriate. - Yes, it is	Yes, the steering committee, and the planned techniques suit us	The implementation modalities do not seem to be adequate: Establish a Project Management Unit at national level	All aspects are adapted in the context of the national level and the involvement of stakeholders.

2. How do you see and want your organization to contribute to the implementation of the project?

Group 1	Group 2	Group 3	Group 4 (online)
- The arrangements are good. All partners have been taken into account - It will be useful to use the work breakdown structure. - The work breakdown structure is a project management tool and a good basis for project planning. - The work breakdown structure allows the project manager to understand the relationship between objectives and results by dividing the project unit into smaller parts. - CSOs: involving them effectively in the implementation of actions at community level - Valuing knowledge and experience gained in the field. - Sectoral administration: involve representatives of these entities at local level at all stages - NMHSs: participation in all phases	We support the idea that the technical services implement the project activities. However, to clarify the mechanism for making funds available in-country	The proposals made in the document are consistent with	The national meteorological service should be involved in all aspects that concern its department. Especially in the decision making (equipment characteristics), operational (equipment installation)

3. Implementing entities do not usually carry out activities in AF projects. This project proposes WMO HydroHub innovation call activities implemented by WMO. This has to be approved and requested by the member countries. Do you agree with this arrangement?

Group 1	Group 2	Group 3	Group 4 (online)
- Yes, it is approved that WMO is implementing the HydroHub as it is a special activity that will contribute to the success of the project. - Yes, WMO is already supporting Cameroon through the APFM (Associated Programme for Flood Management).	Yes, we agree with this arrangement and ask the WMO to involve countries in the implementation of the HydroHub innovation	Yes	Yes, without precisions

4. Would you recommend any adjustments to the implementation and steering arrangements to ensure strong stakeholder engagement?

Group 1	Group 2	Group 3	Group 4 (online)
<ul style="list-style-type: none"> - Well-identified communication channels to enable adhesion/ownership (radio, SMS, town criers, symbols, signs, TV, website, posters, community leaders, etc.) - Establish a partnership between NMHSs and public institutions (SEMRY, SODECOTON, University of Maroua-Kousseri branch). 	Design a focal point structure that facilitates coordination of implementation at country level	We recommend the establishment of a Project Management Unit at the national level composed of: the permanent representative of WMO as Coordinator, the LCBC Focal Point as rapporteur and the members: the sectors involved (Meteorology, Hydraulics, Agriculture, Environment, Water and Forestry, Health, Territorial Administration, Humanitarian Action, Defence, the National Assembly and CSOs.	If we answer yes to question 3, this is an adaptation.

1. Do you check the financial risks and their mitigation measures (Table 18)? Do you have any suggestions?

Group 1	Group 2	Group 3	Group 4 (online)
<ul style="list-style-type: none"> - Provide local content, locally produced materials - Delay in mobilizing internal/external resources - We propose to look beyond financial risks in relation to the content of the table. - Inflation issues (financial risk) 	Major risks were taken into account	Suggestions: set up an additional funding mechanism for contingencies	The risks were checked and the focus was on cooperation between services, data sharing, lack of human resources.

2. Do you notice that something is missing in the project document?

Group 1	Group 2	Group 3	Group 4 (online)
<ul style="list-style-type: none"> - Include and specify hydrometric stations and locations per country and provide a brief overview of tasks/subtasks and responsibilities for each country. - Context and rationale, refer to NAPA and the Strategic Action Programme of LCBC. 	No detailed mechanism for accessing financial and material resources at "Country level	The project document lacks: <ul style="list-style-type: none"> - an in-depth risk analysis - the assessment of specific needs for each country 	Nothing is missing in the project document.

Session 3: ESIA report and ESMRP, Gender Action Plan

ESIA Report and Annexes

1. Are the screening for EMP (Table 16) and the necessary measures appropriate?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
According to Chad's classification, this is not a high risk project. These light measures are appropriate.	Yes, the guidelines underpinning the formulation of these measures are in line with Cameroon's regulations	Yes, the principles and measures adopted by the project are appropriate as they take into account the political policy, institutional and regulatory framework	Yes	the measures are not appropriate. This study can only be a Strategic Environmental Assessment (SEA)	The necessary screenings and measures are appropriate, as they highlight the different aspects that could impact the project implementation environment both environmentally and socially

2. Is there a missing environmental or social impact?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
The land aspect is not clearly identified. This is a factor to be taken into account for the installation of stations on consensual sites	No, but possible environmental impact if all necessary measures are not observed (obstruction of transhumance tracks and elephant migration corridors, water stress)	Although according to the study the potential impacts of the project activities will be related to land acquisition and the generation of waste from the use of batteries in the hydrometric stations, it is necessary to detail them during the installation and implementation phases.	None	Yes, the identified impacts should be related to each project component. The environmental assessment should be based on the project activities, which are the main sources of impacts related to the implementation of the project.	As a missing impact, we can note here the change in behavior that this project will have to impose on the communities that will benefit from its interventions.

3. Does the annex of the ESIA cover everything about the region and the project topics? Are there any proposals for adjustments?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
Chad's legislation is taken into account in the ESIA. There is a need to take into account the cross-border aspect.	Yes	Yes, it covers what concerns the region, no adjustment proposed	- No - Security: Insecurity, conflict over resource use	For security reasons, the study did not take into account the other project areas, apart from Bossangoa. The sample is not representative.	Yes, the ESIA annex covers everything for the Region in line with the Adaptation Fund's expectations on environmental impact.

4. Are the proposed mitigation measures adequate to address the identified environmental risks (Table 19)?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
Although the risks are low, provisions need to be made for the management of potentially risky situations that may arise.	Yes	whether the proposed mitigation measures are an adequate response to the identified environmental risks. NB: Table 19 does not reflect the outline of an ESMP because it does not present the following points: the activities, the source of impact, the potential impact, the mitigation measures mitigation measures and the impact and responsibility	Yes	Table 19 to be revised (content and heading). Match headings to content and differentiate between risks and impacts related to project implementation.	The mitigation measures proposed in the project are adequate to address the identified environmental risks

5. Is there a missing risk?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
Need to take into account spatial management measures as the environment will be shared with livestock, agriculture, housing, fishing and shipping.	- The problem of bush fires (flood-prone ecosystems) - Erosion of river banks - The issue of land ownership on certain sites (hills, buttes in flood-prone areas)	Accessibility problems in some insecure areas heat wave, health risk (cholera) forest fires water contamination	- YES, - Security: Insecurity, conflict over resource use	Yes, the inaccessibility of certain areas due to insecurity	There is the risk of potential inter-community conflicts that could arise around the implementation of this project and provide mitigating measures

Gender Report and Action Plan

1. Does the gender report reflect the situation of gender/youth/minority aspects in the countries?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
We are calling for an improvement in the situation. There is little involvement of women at the institutional level at present.	Women and youth strategy papers were not mentioned	Yes	Yes	Yes	In this project, the gender report reflects the situation of gender/youth/minority aspects with regard to Cameroon

2. Are the activities suggested in the gender action plan relevant and feasible?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
The activities suggested in the action plan are relevant and feasible. The educational level of women and local languages should be taken into account in training and information dissemination.	Yes, especially those concerning community actions	Yes they are and perfectly feasible	- Allocated hydrometric stations should target 100% of vulnerable communities; - 30% of staff (Women) should be trained	Yes, the activities suggested in the gender action plan are relevant and feasible	Given that these activities have taken into account the different needs expressed by the communities themselves and in an integral way considered the different areas, we believe are relevant and feasible. All that is needed are good implementation approaches and inclusive strategies that can take into account all stakeholders in the different country contexts

3. Can the suggested activities meet gender needs?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
Schemes must take account of women's educational level	Yes	Yes, they can meet the needs of women because they will be involved at the grassroots level and allow them to be self-sufficient in certain aspects	Yes	Yes	We believe that the activities suggested in this project could address gender needs.

4. Do you have any other suggestions for action to address gender issues?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
For mainstreaming in the implementation of the project, measures are needed including: - Training of stakeholders on the gender approach; - Development of a strategy during project implementation with gender targets and indicators.	No response	at this stage No	- Identification of community-specific risks - Raising awareness of community men on gender equality	Suggestion: Gender mainstreaming throughout the project cycle	As a further suggestion of measures to be taken to address gender aspects and this according to the particularities of each country context, we can suggest during the implementation to use approaches that could bring the targets to work together in heterogeneous groups (Men/Women/Youth) without taking them in isolation so that it could develop a strong capacity of synergy within the communities

Session 4: Project ownership and sustainability

1. Do you think that the sustainability provisions proposed in the project proposal are relevant and will ensure the sustainability of the project?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
<p>- The sustainability provisions proposed in the proposal are relevant and will ensure the sustainability of the project.</p> <p>But mobilizing financial resources from countries is very difficult.</p>	<p>Yes, if all the provisions (respect of the specifications) are taken at the level of each aspect of sustainability</p> <p>-Lessons learned from the management of previous facilities and from the PULCI experience should be documented and integrated into the project</p>	<p>Yes, they are relevant but not sufficient. It is necessary to ensure that the states take ownership of the project to ensure continuity after the project and support the technical implementation structures.</p> <p>The local authorities must be involved in all the stages from the outset. They must take ownership of the equipment that will be installed.</p>	<p>YES, taking into account the political and cultural dimensions</p>	<p>Yes, the sustainability provisions proposed in the project proposal are relevant and will ensure the sustainability of this project</p>	<p>Yes, the sustainability provisions proposed in the project proposal are relevant and will ensure the sustainability of the project, because as far as Cameroon is concerned, the administration that represents the state is MINEPAT (Ministry of Economy, Planning and Territorial Development) and it is important that it starts working on the sustainability actions of this project as an element in the national planning</p>

2. How can we ensure that organizations provide the necessary resources to support the implementation and also after the implementation of the project?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
<p>- There is a need for strong involvement of the Ministry of Finance and to add them to the steering committee members in order to have better coordination.</p> <p>- Advocacy by partners is needed.</p>	<p>These commitments will be made by the decision-makers in each state</p> <p>However, we suggest that the project activities be taken into account in the budgets of the organizations (sectoral administrations, DTC, etc.)</p>	<p>It is necessary to ensure the mechanism for making funds available to the country implementation structures: There should be a focal point at country level who will manage the necessary funds at the level of his structure through a dedicated account for the implementation of activities. States must commit to supporting post-project activities: maintenance and monitoring of infrastructure.</p>	<p>Incorporate into the budget to align it with the organization's priorities</p>	<p>The sustainability of the project will be achieved through the establishment of a platform for the mobilization of external resources from Technical and Financial Partners (TFPs) and domestic resources (creation of a budget line in the finance law)</p>	<p>- Insist that the planning ministries of each country make the necessary resources available</p> <p>- The WMO should also think about the issue of sustainability by integrating this into the sustainability aspects</p> <p>- Ensure that stakeholders can deliver their commitments on time</p>

3. Do you have your own views and proposals for improving the sustainability of the project?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
- A strong sensitization of administrative, traditional and military authorities at regional, departmental and communal levels.	-Analyze the experience of SODECOTON (Cotton Development Corporation - Cameroon) and integrate good practices into the project -Better involvement of communities and DTCs in the process GWP will have to attract new members in the project area and mobilize them to participate in the monitoring and follow-up of member stations -Effective involvement of producer organizations	Acquire and make available to country structures spare parts for monitoring equipment. Involve local authorities from the outset (local elected officials, traditional chiefs, state representatives, civil society and all organizations working in the field of hydrometeorological resilience). Ensure the training of technicians in the equipment and models that will be provided under the project. Appropriation of the states for the support of the technical services within the framework of this project.	High priority should be given to raising the awareness of policy makers to ensure a proper appreciation of hydrometric data and its contribution to economic development.	Proposal: - Awareness raising for project ownership and equipment protection; - Capacity building of stakeholders on the use of the equipment and interpretation of the products, then install the equipment on secured sites (police stations, churches, gendarmerie etc.)	Also think of making pleas to the decentralized territorial authorities of the different countries so that they can integrate into their various budgets the resources necessary to accompany the sustainability of the actions of this project after implementation, this at the local level, will be quite relevant as a source of sustainable support

4. How can project activities be included in national level operational plans (NHS, NMS, DRR, civil protection, CSOs)?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
The Directorates concerned (ANAM and DRE) will integrate them into their annual work plans (PTBA).	-Signing of an MOU between all parties (Institutions) - integration in the communication strategy, an activity to raise awareness of the communities on the importance of hydro-climatic knowledge and the need for their participation in the maintenance of the equipment (CSOs)	Develop strategies for integrating project implementation activities into the programmes of the national structures involved in the project with the support of the government and technical and financial partners.	Integrating and aligning the institution's mandate and priorities	Project activities can be included in national level business plans Through government involvement in implementation through budget lines in the finance act and the development of master plans as well as the development of sectoral strategic plans	The project leaders must make representations to the authorities in each country responsible for these issues so that they integrate these aspects into the upstream preparation. And it is important that the planning schedules in the different countries are known

5. How can the project become part of your daily work?

Chad	Cameroon	Niger	Nigeria	Central African Republic	On-line participants
- Adopt practical arrangements to be able to provide regular climate information. - Establish a coordination unit between the two services (ANAM and DRE)	-Establish permanent communication with station observers (CSOs) -Effective involvement of the representatives of the sectoral administrations and the DTCs through the inclusion of the project's activities in their Annual Work Plans	Develop strategies for integrating project implementation activities into the programmes of the national structures involved in the project with the support of the government and technical and financial partners.	Integrating and aligning the institution's mandate and priorities	The project can be part of the daily work through the implementation of sectoral Annual Work Plans	- As far as the national meteorological and hydrological services are concerned, these activities are already part of their daily work; - This project will simply allow them to get closer to the populations and help them explain how the infrastructures could be used and what they are for; - Getting closer to the CSOs that will play the role of relays - As CSOs, it would be necessary to either enroll CSOs as implementation partners on the ground in a direct way or to allow them to participate in an indirect way as partners in synergy because the project will not be able to enroll all CSOs

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