ADAPTATION FUND

REGIONAL PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

Title of Project/Programme:	Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate
Countries:	Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan[1]
Thematic Focal Area:	Disaster risk reduction and early warning systems
Type of Implementing Entity:	MIE
Implementing Entity:	UNESCO
Executing Entity:	UNESCO Cluster office in Almaty
Amount of Financing Requested:	USD 6,500,000

Project / Programme Background and Context:

Provide brief information on the problem the proposed project/programme is aiming to solve, including both the regional and the country perspective. Outline the economic social, development and environmental context in which the project would operate in those countries.

Central Asia is facing important challenges to coping with the adverse effects of climate change. A 2009 study by the World Bank found that Tajikistan and Uzbekistan had the highest degree of sensitivity to climate change in Europe and Central Asia and the lowest degree of adaptive capacity.[2] In particular, the impacts of climate change on water-related disasters in the region have been recognised as a key threat.[3] In Central Asia, socio-economically disadvantaged, indigenous groups, ethnic minorities, women, children and elderly are highly sensitive and particularly vulnerable to the impacts of climate change, as resilience and coping capacities are typically low.

One of the most significant effects of global warming in Central Asia (CA) is glacial melting and the associated formation of glacial lakes. Around the beginning of the 1970s, accelerated glacier

[1] The project concept included three countries (Kazakhstan, Tajikistan, and Uzbekistan) with the understanding that Kyrgyzstan would participate if possible. The Government of Kyrgyzstan has now endorsed the project, and its participation is reflected in the project activities and revised budget.

[2] World Bank (2009). *Adapting to Climate Change in Europe and Central Asia.* Washington, DC: World Bank.

[3] The declaration of the International conference on water-related natural disaster reduction, held in 2008 in Dushanbe, stated that research on the impacts of climate variability and change on water related disasters should be increased, in particular with the aim to develop adaptation strategies and mitigation measures. Water scarcity coupled with climate change related disasters has been recognized as a critical challenge in Central Asia region during the high-level international conference on the implementation of the "Water for Life" decade, held in Dushanbe, Tajikistan in June 2015. The pre-conference forum on Climate and Water dialogue, held in June 2018 in Dushanbe Tajikistan, at the occasion of the High Level International Conference on the International Decade for Action "Water for Sustainable Development" 2018-2028 recognized that melting glaciers pose threat to water security in CA at national and regional levels, and emphasized the necessity to showcase how implementing water resilient strategies can contribute to the adaptation and mitigation objectives set out in the Paris Climate Agreement and DRR in Sendai Framework for Action.

mass loss has been reported in the region (Sorg et al., 2012; Farinotti et al., 2015; Hoelzl et al., 2017). Today's rate of glacier loss in CA is 0.2–1% per year in volume. Furthermore, a 2017 analysis found that the impact of future climate change on glaciers in Central Asia is expected to be substantial: scenarios indicate that with a global temperature increase of 1.5°C, glacier mass in the Tien Shan range could decrease by 31%, while a 2° temperature increase could result in losses of up to 66%.[4] Due to glacier melting and lake formation, there is an increased danger of **Glacier Lake Outburst Floods (GLOFs)**, which confound and exacerbate water-related threats to mountain communities, their settlements, livelihood, and infrastructure located on river floodplain areas.

GLOF Hazards and Exposure

In the past two decades, GLOFs have resulted in significant economic damages and loss of life. In 1998, a GLOF in the Shakhimardan River catchment in Uzbekistan resulted in 93 fatalities, and in 2002, a GLOF in Dasht, Tajikistan left dozens of people dead. More recently, high temperatures and rapid melting in July 2015 triggered mudflows in the mountainous regions of Tajikistan. In 2008, a GLOF at the Zyndan glacial lake in Kyrgyzstan killed three people and led to substantial economic losses. Meltwater outbursts from the Aksai glacier in northern Kyrgyzstan triggered a GLOF that damaged houses and roads in villages down the valley. The lake still poses a continuous threat to the capital city of Bishkek. In 2015, a GLOF near Almaty, Kazakhstan caused the evacuation of over 1,000 people and 78 injuries. In addition, 127 houses were damaged. Across the region, experts estimate that nearly 100,000 people in mountainous areas face GLOF threats, with many others at risk downstream. In addition, several mountainous areas are relatively popular tourist destinations, which also places visitors at risk.

The incidence of dangerous glacial lakes in Central Asia is also increasing. A 2015 study in Kazakhstan identified 32 lakes in the Ile Alata region and 110 lakes in Zhetysu Alatau region that had a water volume exceeding 100,000 m^3. In Kyrgyzstan, the latest inventory indicates that there are more than 350 glacial lakes in danger of outburst. Each year, there are twenty lakes that are in acute danger of failure, and approximately 300 settlements are exposed to potential GLOFs. Threats can appear rapidly; in the case of the Zyndan GLOF, the lake formed over a period of only two and a half months In Tajikistan, complex topography, high rainfall levels, and a large number of glaciers lead to a high level of exposure, and the south-western Pamir mountain range contains around 335 lakes with GLOF potential. In Uzbekistan, very large floods and mudslides are generally caused by the outburst of mountain lakes. According to Uzbekistan’s hydromet agency, the country is threatened with 271 potential GLOFs, most of which are located outside its border.

[4] Reyer et al. (2015) in Zholdosheva, E. et al. (2017). *Outlook on climate change adaptation in the Central Asian Mountains.* Mountain Adaptation Outlook Series. UN Environment, GRID-Arendal, RMCCA. Nairobi, Vienna, Arendal, Bishkek. www.unep.org, www.grida.no.

Figure 1: Glaciers of Central Asia

The number of glacial lakes and incidences of failure are expected to increase further as new lakes continue to develop and surrounding steep slopes destabilize in response to warming, particularly warmer summer temperatures. In Central Asia, regional scientific studies suggest that glacier shrinkage is causing more frequent hazards, including GLOFs (see Figure 1; Hoelzle et al., 2017). In addition to the large volume of water released by GLOFs, they present a significant transboundary hazard. Hence, the increasing risk of disasters from GLOFs is a significant threat to national and regional security and to sustainable development in Central Asia. In fact, during the international seminar co-organized by the UN Regional Centre for Preventive Diplomacy in Central Asia and UNESCO, *"The Impact of Glaciers Melting in Central Asia on National and Trans-Boundary Water Systems"* in Almaty, Kazakhstan, in April 2013, GLOFs were specifically highlighted as a key threat to the socio-economic development of the region. In June 2018, an international Climate and Water Forum held in Dushanbe, Tajikistan, reaffirmed the linkages between climate change, water resources, and disaster risk reduction in mountainous communities in Central Asia and highlighted the importance of partnerships between academia, hydromet agencies, ministries, and civil society in addressing threats.

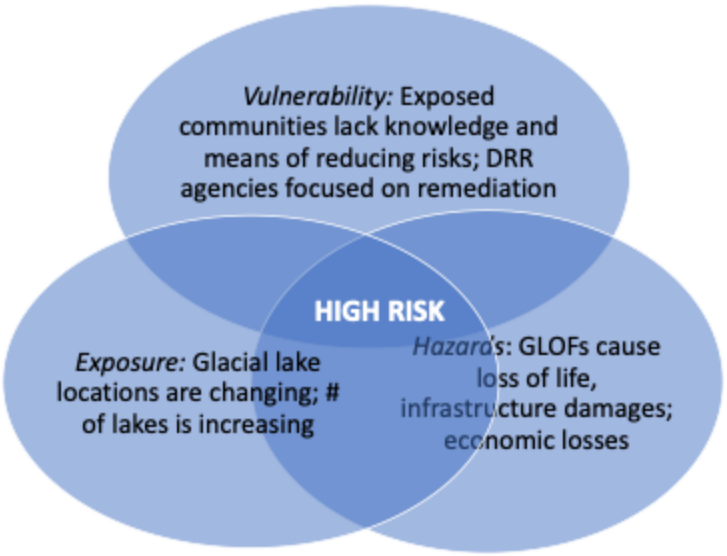

Figure 2: GLOF Climate Risk Factors

DRR and Adaptation in Central Asia

With the global emergence of new commitments to disaster risk reduction (DRR) and climate change adaptation (CCA), the issue of monitoring, forecasting and early warnings of natural hazards (including on GLOFs) is gaining importance in the region. In 2015, representatives from Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan endorsed a joint statement of support for a post-2015 framework for disaster risk reduction and expressed a commitment to "develop, assess, and monitor regional and national programs of disaster risk reduction in accordance with the post-2015 framework for disaster risk reduction."[5] At a subsequent regional platform meeting for DRR in 2016 in Dushanbe, Tajikistan, participants called for the establishment of a regional forum to strengthen collaboration and provide important support to implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 at local, national, regional levels.

In the Central Asian region, which was part of the Soviet Union, disaster response has been traditionally stronger than prevention and preparedness. At present, the relevant ministries/committees (the Committee for Emergency Situations in Kazakhstan, the Committee of Emergency Situations and Civil Defence in Tajikistan, and the Ministry of Emergency Situations in Uzbekistan) still focus primarily on disaster response.

With the emergence of DRR as an area of cooperation, several country-level and bilateral programs have begun to address the issue. Countries in Central Asia maintain some common legislative links through their membership in the Commonwealth of Independent States (CIS). For example, in 2014, Kazakhstan, Kyrgyzstan, Uzbekistan, and Tajikistan adopted a model act on

[5] Joint Statement of the Countries of Central Asia and South Caucasus regarding the post-2015 framework for disaster risk reduction. Approved by the participants of the Regional Ministerial Meeting of Countries of Central Asia and South Caucasus for cooperation in the post-2015 Framework for Disaster Risk Reduction January 30, 2015, Bishkek, Kyrgyz Republic.

international disaster assistance through the Inter-Parliamentary Assembly of the CIS. In January 2017, the four countries participated in a regional consultative conference on the legal aspects of disaster risk reduction.

In programming, the EU-funded Disaster Preparedness ECHO Programme (DIPECHO) has supported a variety of policy and education/training activities in Central Asian Countries. In 2016, DIPECHO also supported the establishment of the inter-governmental Kazakhstan-Kyrgyzstan Center for Emergency Situations and Disaster Risk Reduction (CESDRR) in Almaty, Kazakhstan. Non-governmental actors are also involved in DRR activities: the Aga Khan Agency for Habitat, for example, is currently cooperating with CESDRR on emergency response and DRR. However, country programming on DRR is at a relatively early stage, and it faces shortages of funding and qualified personnel. Furthermore, GLOFs have not been addressed explicitly in programming to date. Finally, research institutes have undertaken some work in GLOF monitoring in conjunction with partners from other regions. However, this research is not coordinated across Central Asian countries, and it does not necessarily feed into policy-making.

In addition, over the past three years, the UNESCO Almaty office has helped to build knowledge and capacities in Central Asian countries in sound water management and DRR. A total of 1,478 people have been trained in the areas of water research; governance and education; water diplomacy and cooperation; geohazard risk reduction; glacier research; and risk reduction related to glacial melting. These initiatives included training, workshops, and summer schools aimed at a variety of stakeholders: scientists and policy makers, managers, young civil servants, and young researchers. More than 268 young scientists were trained in field work in the areas of glacier mass balance measurements, landslide research and risk reduction, GLOFs, and other related topics.

The participating countries also recognize that building resilience and reducing societal vulnerabilities to climate related disasters is a key requirement for sustainable development. The United Nations 2030 Agenda for Sustainable Development specifically pledges to reduce physical and economic losses caused from water-related disasters, with a focus on the most vulnerable communities, and furthermore highlights the need for improved education, awareness-raising, and capacity building in relation to climate change impacts and early warning (SDG targets 11.5, 13.1 and 13.3). All four countries are members of the United Nations Framework Convention on Climate change (UNFCCC), and they have ratified the Kyoto Protocol and have signed the 2015 Paris Agreement. The participating countries in this project are on record that they “Confirm commitment to promotion of coordinated and mutually-supporting approach in the post-2015 framework for disaster risk reduction, the sustainable development goals, and the climate change agreements….”[6]

Target Area of the Project

[6] Ibid.

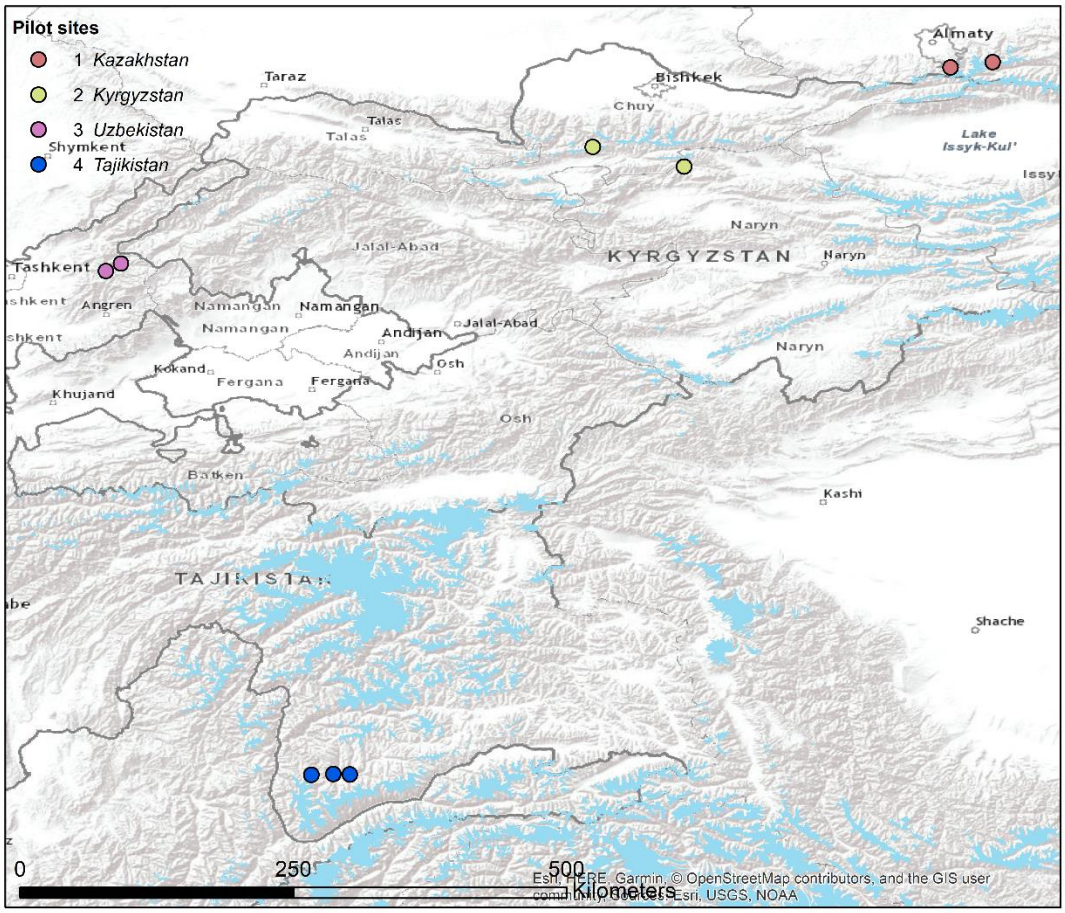

Figure 3: Map of the Target Area of the Project

The target area of the project covers vulnerable communities across several mountain ranges in Central Asia. Following discussions with government stakeholders, an initial group of pilot communities was identified based on representativeness of mountainous communities at risk of GLOFs, magnitude of exposure to GLOF threats, and vulnerability (e.g. communities with limited resources in need of assistance). The target communities are home to more than 85,000 people representing a number of different nationalities.

In Kazakhstan, the pilot villages of Esik and Talgar are located in the Almaty region in the foothills of the Tien Shan mountains. In Kyrgyzstan, the pilot villages of Tosh-Bulak and Yurevka are located in the north central part of the country in the Ala-Too Range. In Tajikistan, the pilot villages are located in the district of Shugnon, which is located in the southwestern part of the Pamir Range, and all are directly threatened by two glacial lakes in the upper reaches of the Varshez glacial lake. In Uzbekistan, the pilot communities, Pskem and Tepar, are located in the Pskem mountain range of the West Tien Shan near the border with Kyrgyzstan. Two glacial lakes are located in the upper reaches of the Pskem River: Shavurkul Lake and Ikhnach Lake, which contain 5 million and 4 million cubic meters of water, respectively. Detailed community profiles are provided in Annex 4 of the project, and baseline community consultation information is provided in Annex 2. The pilot communities for the project were selected on the basis of an ongoing dialogue with the participating governments. For the initial pilots, the governments identified communities that were currently exposed to an immediate GLOF threat and had a relatively high

level of vulnerability. The selected communities were also reviewed at the project stakeholder validation workshop.

Barriers to Adaptation

Multiple barriers prevent effective DRR and adaptation to climate threats at a national and regional level in Central Asia.

Institutional barriers: at the institutional level, there is a lack of a policy framework for day-to-day coordination between local and national authorities and between countries in the region. This means that there is no regional cooperation for the assessment and monitoring of transboundary GLOFs. The lack of formal cooperation makes it extremely difficult to deal with transboundary threats, and it prevents authorities from benefitting from knowledge and good practice in other areas within and adjacent to their own country.

Moreover, there is low coordination and synergy between existing institutional structures. At present, there is no way to consolidate the existing knowledge on glaciers, glacial lakes, and GLOF events, which could enhance the ability of policy makers in Central Asia to understand the associated risks.

Organizational barriers: At the organizational level, the capacity of relevant authorities to monitor and reduce risk is weak. An underlying lack of knowledge about the distribution and severity of GLOF threats makes it very difficult to identify communities that are at high risk. This is caused by insufficient monitoring. While lake monitoring exists to a certain extent in countries like Kazakhstan and Kyrgyzstan, it consists of regular helicopter flights over the glaciated areas, which is not cost-effective or sustainable.

Furthermore, disaster management authorities lack the funding and expertise to conduct a risk analysis of the communities affected by GLOFs, which hinders authorities in identifying the most vulnerable communities exposed to GLOF threats. Current initiatives do not have the capacity to manage the risks posed by melting glaciers, including issuing early warning of GLOFs. Institutions are poorly equipped with modern technologies for early warning systems (EWS). Furthermore, there are no mechanisms available among disaster experts, managers and planners to develop local risk reduction plans in response to GLOFs. In fact, DRR stakeholders at the national level do not have linkages with vulnerable groups at the community level that could inform their work.

In the research community, there are no formal links and very little cooperation on GLOF-related research across Central Asia, although joint research and technical exchange would be extremely beneficial, especially regarding transboundary hazards.

In addition, organizations lack the capacity to design and produce awareness-raising materials, such as educational materials for school-age children or maps and infographics for communities that are available in the relevant formats and languages.

Individual-level barriers: At the individual level, relevant authorities face a critical gap in knowledge concerning glacier lake distribution, risk mapping, and disaster prevention planning from GLOFs. They also lack information on how implement early warning systems and other adaptation measures. Furthermore, communities at risk are not trained in emergency planning or safety measures. In addition, young local scientists have not had an opportunity to acquire fundamental knowledge regarding the cryosphere, glacier lakes, and related hazards that will allow them to

make substantive contributions to mapping, monitoring, mainstreaming DRR into practice.[7] All stakeholders lack a consolidated source of information on GLOFs and GLOF risks and risk reduction, and vulnerable groups cannot get the information they need through the formal and informal communication channels they use. Vulnerable groups also lack adequate awareness, education and training opportunities on GLOFs at the community level, especially in remote areas.

Project / Programme Objectives:

The objective of the proposed project is to strengthen adaptation to climate change in Central Asia by reducing societal risks and vulnerabilities associated with GLOFs. This objective also addresses SDGs 11 and 13 of the 2030 Agenda, particularly targets 11.5 and 13.1 and 13.3.

The project objective will be achieved by assessing societal risks and vulnerabilities associated with GLOFs and then addressing these risks and vulnerabilities. The approach will strengthen the monitoring, analytical and response capacities of institutions and government officials responsible for DRR, emergencies and CCA through community and gender-sensitive ground-level training and awareness campaigns, and through the establishment of early warning systems (EWS), supported with the necessary state-of-the-art monitoring strategies. The emerging and increasing risk associated with GLOFs, together with appropriate response and adaptation strategies will be brought to the forefront of attention for decision makers and communities in all of the participating countries.

The overall approach of the project is to assess vulnerability through work with technical experts and communities and then address vulnerability through targeted systems and measures while building capacity for prevention activities. The logic of the project intervention is provided in Figure 2. It is the regional approach that will contribute to improved coping with climate change and its consequences through information and experience exchange with regard to best practices in CCA and DRR. Discussion of the benefits of a regional approach is provided in Section II.A.

Project / Programme Components and Financing:

Table 1: Project Components and Financing

Project/Programme Components	Expected Outcomes	Expected Outputs	Countries[8]	Amount (US$)
1. Strengthening national and regional capacity to monitor and assess GLOF hazards	Authorities in participating countries have improved knowledge of potential GLOF hazards and a coordinated national and	Appropriate mapping and monitoring strategies developed Up-to-date atlas on glacier lakes for all participating	Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan	820,000

[7] A separate stakeholder consultation was held with university students and early-career researchers focusing on DRR topics in Almaty on March 13-14, 2019. Findings are provided in Annex 2.

	regional approach to mapping and monitoring potential GLOF sites.	countries based on remote sensing data developed and maintained. Organizational capacity to implement and oversee mapping and monitoring strengthened, with an emphasis on transboundary hazards		
2. Strengthening sub-national, national, and regional policies and approaches to meet needs of vulnerable communities	Decision-makers and vulnerable households are aware of GLOF threats and have the necessary information to plan measures to adapt to those threats.	Vulnerability assessment and exposure maps developed for endangered communities, including gender and sector-specific analyses. Local knowledge on GLOF risks and related adaptation needs documented and local risk reduction plans drafted for selected communities vulnerable to GLOFs. DRR and CCA concepts mainstreamed into sub-national development planning in the relevant country context	Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan	1,364,800
3. Design and launch of EWS and risk reduction measures tailored to local contexts	A coordinated EWS network is designed and embedded in the institutional setting for disaster risk	Local to regional framework for EWS established and evaluated. Design and implementation plans for four site-	Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan	1,070,000

	management at all levels.	specific EWS completed.		
4. Targeted demonstration projects to introduce EWS technology and low-cost adaptation measures in vulnerable communities.	Risk from GLOF hazards reduced in pilot communities and relevant agencies have the means to maintain adaptation measures and upscale them to other vulnerable communities.	EWS tested in selected vulnerable communities. Complementary adaptation measures implemented. Authorities and population trained through simulation exercises and other means as needed. Maintenance and financing strategy developed for ensuring long-term sustainability of the EWS and complementary adaptation activities and the expansion of adaptation activities to other vulnerable communities.	Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan,	1,763,444
5. Knowledge exchange, stakeholder engagement, and communication.	Researchers, government authorities and communities have improved access to, and use, information on GLOF hazards and risk reduction measures to adapt to them.	Web-based knowledge-platform established on GLOF risks and adaptation strategies. Education and training programmes undertaken to equip stakeholders with knowledge and capacity to prepare for, respond to and recover from GLOF disasters.	Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan	910,000

		Knowledge and lessons learned from the targeted demonstration projects disseminated within Central Asia and across other high mountain regions.		
6. Project/Programme Execution cost 7. Total Project/Programme Cost 8. Project/Programme Cycle Management Fee charged by the Implementing Entity (if applicable)				90,275 6,018,519 481,481
Country budget breakdown				
Kazakhstan	**Kyrgyzstan**	**Uzbekistan**	**Tajikistan**	
1,405,625	1,405,625	1,405,625	1,405,625	
Amount of Financing Requested				**6,500,000**

Table 1a: Project calendar of project milestones

Milestones	Expected Dates (tentative)
Start of Project/Programme Implementation	June 2020
Mid-term Review (if planned)	June 2022
Project/Programme Closing	May 2025
Terminal Evaluation	June 2025

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.*

This project will reduce climate change induced risks and vulnerabilities from GLOFs in Central Asia through coordinated risk identification and community-embedded adaptation measures.

More broadly, the project will build societal awareness and thereby resilience to the threat of climate change, particularly water-related disasters. Adaptation measures, including EWS, are strongly promoted by the Sendai Framework for Disaster Risk Reduction 2015-2030, to which Central Asian countries are committed. According to the United Nations Office for Disaster Risk Reduction (UNISDR), the following are four key elements of EWS: I. risk knowledge; II. monitoring and warning service; III. dissemination and communication; and IV. response capability. In addition, the project will enhance risk knowledge and response capability with activities that map potential threats and implement low-cost adaptation measures to reduce community risk. Capacity strengthening, highlighted in the 2030 Agenda under SDG 13 Target 13.1, will also be addressed in all project components through training, institutional twinning, participatory planning, and knowledge exchange. Finally, the project will support explicit measures to promote sustainability: the identification of post-project and expanded financing for EWS in vulnerable communities, and the dissemination of GLOF information and good practice in risk reduction in GLOF areas.

A core strength of this project is its focus on a ***regional approach*** to adaptation activities. This is crucial, as GLOFs represent far-reaching climate hazards that may originate in remote regions and cause damage in areas that are hundreds of kilometres downstream, possibly located in the territory of another country. Far-reaching GLOF disasters with transboundary impacts have already occurred in Central Asia; for example, the 1998 outburst event at the Archa-Bashy glacier in Kyrgyzstan caused the deaths of more than 100 residents of Shahimardan in neighboring Uzbekistan. The regional approach also takes advantage of the fact that the countries have similar government structures and share a common administrative and research past. Furthermore, a regional approach will allow the countries to utilize additional research capacity, such as the Central Asian Regional Glaciological Center under the auspices of UNESCO, based in Almaty and policy capacity, such as the Regional Center for Emergency Situations and DRR.

Therefore, this project emphasizes the development of common monitoring, assessment, and response strategies, while also recognizing that final implementation must be tailored to local physical, cultural and societal contexts. The project will facilitate several regional exchange workshops, enabling experiences and knowledge to be shared and transferred between partners, while the implementation of four distinct pilot demonstration projects will provide a basis for comparative evaluation, identifying successes and lessons learnt between countries. Such capacity building and development at multiple levels will ensure that the countries are well equipped and motivated to maintain long-term, sustainable adaptation strategies implemented under this project.

The project is directly aligned with four Adaptation Fund outcomes: Outcome 1 (Reduced exposure to climate change hazards and threats); Outcome 2 (Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses); Outcome 3 (Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level); and Outcome 4 (Improved policies and regulations that promote and enforce resilience).

Component 1: Strengthening national and regional capacity to monitor and assess GLOF hazards

This project component recognizes that a comprehensive and successful adaptation project addressing water-related disasters must be built on a robust foundation of best available understanding of current and future glacier evolution, which is the basis of GLOF threats across

Central Asia. In a first step, knowledge on past and future variations in essential climate variables (primarily changes in temperature and precipitation, and the response of glaciers and permafrost), which in turn influence development and susceptibility of glacial lakes, will be reviewed, compiled and improved. GLOF threats can develop rapidly and have far-reaching effects. Hence, first-order monitoring strategies are best implemented at the regional-scale, using remotely sensed imagery, supported with available long-term ground-based measurements, and modelling approaches. Furthermore, anticipation of where new lakes may develop as glaciers continue to retreat, ensures adaptation strategies may be optimized for current, emerging, and future threats, and maladaptation can be avoided. Training of national responsible authorities in these methods and technologies will enable homogenous monitoring programs to be implemented across Central Asia.

The capacity building program will be broadened to include training modules on the fundamentals of glaciers, lakes, and hazards within national educational institutions with the subsequent goal of establishing inter-university cooperation and networking in the region in these sectors through the UNESCO UNITWIN program. While a common regional methodology framework will be applied, training will be tailored to the local context of each country, and it will help ensure the long-term sustainability of the adaptation measures implemented under Component 4. In addition, citizen science initiatives for monitoring glacier change will be considered in order to expand on-the-ground monitoring efforts. Finally, steps will also be taken to ensure that participation in GLOF monitoring and mapping, including supporting capacity strengthening, is gender-balanced.

Component 1 will encompass the following outputs and indicative activities:

Output 1.1: Appropriate mapping and monitoring strategies developed

Indicative activities under Output 1.1 will include:

1.1.1. Review and assessment of observed and projected changes in essential climate variables across Central Asia, providing context and basis for design of the lake monitoring programs, and establishing synergies with ongoing and future regional cryosphere initiatives (see Part II G).

1.1.2. Consultation with country authorities to develop a handbook and best-practice guidance documents, outlining a homogenous strategy for remote sensing and field-based monitoring of glacier lakes and surrounding periglacial terrain that uses common data sources and techniques. A citizen science component will be considered here.

1.1.3. User-friendly visualization and analytical toolbox for anticipating where new lakes and therefore threats will develop over the 21st century as glaciers retreat.

1.1.4. Monitoring strategies presented to governance structures at the national and regional level.

Output 1.2: Up-to-date atlas on glacier lakes for each country based on remote sensing data, supported by *in situ* measurements, developed and maintained.

Indicative activities under Output 1.2 will include:

1.2.1. Glacier lakes mapped across Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan for the most recently available satellite imagery (2018 – 2019); e.g., freely available Landsat or Sentinel images.

1.2.2. Retrospective mapping of previous lake distribution and extents for defined periods, to establish change in GLOF threat over past decades and identify rapidly emerging problems.

1.2.3. Estimation of key lake parameters (e.g. area, volume, mean depth), supported and validated with available *in situ* measurements.

1.2.4. Integration of findings into a user-friendly database (see Component 5) where mapped information on glacial lakes will be maintained by and available to local authorities along with the vulnerability assessment findings and community mapping carried out in Component 2.

Output 1.3: Organizational capacity to implement and oversee mapping and monitoring strengthened, with an emphasis on regional cooperation on transboundary hazards.

Indicative activities under Output 1.3 will include:

1.3.1. Training workshops with local authorities in each country to ensure understanding of mapping and monitoring strategies and to introduce adaptation response strategies.

1.3.2. Design and implementation of a capacity building and twinning program in national universities, ensuring next generation of young local scientists are equipped with fundamental knowledge regarding the cryosphere, glacier lakes and related hazards, as well as integrated DRM.

1.3.3. Regional workshops to facilitate exchange of knowledge and experience between countries, with a view to establishing a permanent ongoing exchange mechanism in the region.

Component 2: Strengthening local, national, and regional policies and approaches to address the needs of vulnerable communities

This component is framed by the concept of climate risk endorsed by the Intergovernmental Panel on Climate Change in their latest assessment reports (Special Report on Managing the Risk of Extreme Events and the Fifth Assessment Report). The concept encourages a holistic approach, recognizing that climate related risk results from a physical event or hazard (e.g. GLOF) intercepting with an exposed and vulnerable system (e.g. community). In this conceptual model, risk reduction strategies such as EWS are seen as a key tool for climate change adaptation.

There will be two scales to the risk assessment. Firstly, a *hazard assessment* for all lakes and associated downstream affected land areas will be conducted at the regional scale. While a core assessment procedure will be homogenised, some physical, societal, and economic drivers of risk may vary between countries, such that approaches will be tailored for the local context.

Secondly, the project will conduct *community assessments*, working with local authorities and community members to assess their baseline knowledge of risks, to gather local knowledge, and to identify local patterns and behaviours that may affect vulnerability and access to DRR information. The project will liaise with national organizations for the advancement of women and local authorities to ensure meaningful participation in the community assessments by women.

As a result of the assessments, critical GLOF risk hot spots will be identified in each country. These hot spots will be evaluated together with high-priority sites identified by local authorities, leading to local-scale assessments supported by field studies and validation at the most critical sites. This multi-level approach ensures that subsequent monitoring, preparedness, and EWS strategies are targeted to those lakes and downstream areas where risk of disaster is greatest. In these hot spots, the project will support the development of Local Risk Reduction Plans in conjunction with the vulnerable communities.

Finally, Component 2 will support development of DRR and CCA concepts to be mainstreamed into local development plans. During the project preparation phase, the sub-national planning process for provinces and districts will be surveyed for the participating countries and entry points for mainstreaming will be identified. These findings will serve as a baseline for the project activities under Output 2.4.

Component 2 will encompass the following outputs and indicative activities:

Output 2.1: Vulnerability assessment and exposure maps developed for endangered communities, including gender and sector-specific analyses

Indicative activities under Output 2.1 will include:

2.1.1. Development of a common GLOF hazard and risk assessment procedure, elaborated for the physical, social and environmental context of each country.

2.1.2. Preliminary estimates of the likelihood of outburst established for every current and anticipated future glacial lake, and downstream flood-prone land areas identified.

2.1.3. Assessment of vulnerability and exposure of communities and infrastructure within flood-prone land areas based on proxy indicators (e.g. population density, urban land area etc.) At least four women-only focus groups will be convened in the assessment process

2.1.4. Identification of hotspots (based on the findings from 2.1.1. – 2.1.3.) and compilation of comprehensive local-scale GLOF hazard assessment and maps for both current and future scenarios.

Output 2.2: Local risk reduction plans drafted for selected communities vulnerable to GLOFs.

Indicative activities under Output 2.2 will include:

2.2.1. Ground-level mapping and assessment of infrastructure and assets located within flood-prone valleys.

2.2.2. Community-level studies of vulnerability through participatory surveys and interviews. Evaluation of the risk perception of men and women in local communities exposed to GLOF hazards, including the local knowledge of current hazards and past events, and how this is affecting their daily lives.

2.2.3. Elaborated basket of hard and soft adaptation options, emphasising no-regret adaptation options. Hard options include artificial lake lowering, armouring of the lake dam and channel area etc, whereas soft options typically aim to reduce exposure and vulnerability of the community.

This includes several no-regret options that are part of, and support a fully operational EWS, such as institutional training and capacity building, evacuation and response planning, training drills and community awareness raising.

2.2.4. Community level feasibility study to evaluate local adaptation needs and expectations.

2.2.5. Development of Local Risk Reduction Plans and discussion of plans with participating communities on the basis of information gathered under activities 2.2.1 and 2.2.4.

Output 2.3: DRR and CCA concepts mainstreamed into local development planning in the relevant country context.

Indicative activities under Output 2.3 will include:

2.3.1 Compilation of good practice in mainstreaming DRR and CCA into sub-national development planning, particularly in mountainous regions, and a review of its applicability for men and women in participating countries.

2.3.2 Preparation of policy/planning roadmaps for integrating DRR and CCA concepts into local planning documents.

2.3.3 Technical support for mainstreaming in selected districts, including training for local-level authorities on DRR and CCA concepts and CCA content for trainings such as those provided by UNISDR.

Component 3: Design and launch of EWS and risk reduction measures tailored to local contexts

Early Warning is “the provision of timely and effective information, through identified institutions, that allows individuals exposed to hazard to take action to avoid or reduce their risk and prepare for effective response”. The importance and need to promote, invest in, develop, maintain and strengthen EWS is mentioned several times in the Sendai Framework. In Component 3 the institutional mechanisms will be evaluated and established if needed, and EWS concepts will be elaborated for the study sites in each country as defined by the needs of the participating governments and informed by the findings from Component 2. Information on potential pilot sites is provided in Annex 4 of this concept, based on national consultations with authorities in each of the participating countries, during the PPG phase. Specific activities to support gender-sensitive EWS design and launch are listed in Annex 3.

Component 3 will encompass the following outputs and indicative activities:

Output 3.1: Local to regional framework of institutional DRR context established and evaluated

Indicative activities under Output 3.1 will include:

3.1.1. Evaluation of the process, roles and responsibilities of institutions and organizations involved in EWS as mandated by law in all project countries. Synchronization of GLOF specific aspects with existing mechanisms, institutional entities and platforms for other types of hazards for creating an institutional infrastructure for multi-hazard management of disaster risks.

3.1.2. Establishment of required institutional mechanisms and framework conditions (if necessary).

3.1.3. Evaluation and establishment of responsibilities and protocols for the dissemination of warnings, including the evaluation of potential means for the communication of alerts and warnings to ensure all members of the population, both men and women, receive the message.

3.1.4. Evaluation of long-term funding possibilities of EWS, including maintenance costs.

Output 3.2: Design and implementation plans for four site-specific EWS completed

Indicative activities under Output 3.2 will include:

3.2.1. For each study site: Identification of the environmental parameters critical for GLOF hazards and evaluation of monitoring methods (sensors and specifications).

3.2.2. For each study site: Elaboration of a data storage and access system, pre-definition of warning thresholds.

3.2.3. For each study site: Elaboration of institutional integration of EWS protocols with existing authorities and institutional entities

3.2.4. For each study site: Identification and design of complimentary adaptation measures to reduce GLOF hazard and exposure (see basket of adaptation options – Output 2.2). A focus will also be given to green adaptation options, such as tree plantation to stabilise slopes and reduce bank erosion.

3.2.5. Definition of community needs for GLOF early warning based on the documentation of local GLOF risk perception and adaptation needs. Who needs to be warned, why, when, and how.

3.2.6. Information and capacity building with involved authorities on EWS implementation, operation, and maintenance.

Component 4: Targeted demonstration projects to introduce technologies and best practices for EWS for glacier lakes

Based on the recommendation of the local authorities, and the results of the large-scale risk assessment (Component 2), this component will implement one EWS tailored to the requirements of each participating country. Communities will also implement complementary low-cost / no-cost adaptation measures to increase resilience, such as hazard zone demarcation, the identification of evacuation routes and safe zones, and the management of drainage channels. The advantage of promoting these complementary measures is that they can be scaled up to communities even in the absence of an EWS, and the project will consider using peer educators to reach target groups.

Component 4 will encompass the following Outputs and indicative activities:

Output 4.1: EWS tested in selected vulnerable communities.

Indicative activities under Output 4.1 will include:

4.1.1. Identifying a company/institute, if possible local, to take over the technical engineering, including the acquisition of suitable equipment, the construction of the EWS stations, and the electronic and software engineering for the data transfer, processing and storage.

4.1.2. Detailed technical planning of the EWS: Identification of survey, monitoring, and communication stations; design of alerting and warning infrastructure and means of communication

4.1.3. Test phase of EWS (ca. 12 months) for system calibration and adjustment and familiarization by responsible authorities

4.1.4. Adoption of low-cost / no-cost measures such as hazard zone demarcation and identifying safe zones and evacuation routes in the EWS communities and possibly in additional communities.

Output 4.2: Complementary adaptation measures implemented

Indicative activities under Output 4.2 will include:

4.2.1. Identifying a local company to implement civil engineering, including the construction of spillways, slope stabilisation measures (including tree plantations), channel maintenance, flood protection and deflection structures.

4.2.2. Detailed technical planning of the engineering measures: Site identification; design specifications of the structural measures, environmental impact assessment, and other necessary permitting.

4.2.3. Elaboration of maintenance plans and technical handbooks to ensure long-term operability and sustainability of the adaptation measures.

4.2.4. Adoption of low-cost / no-cost measures such as hazard zone demarcation and identifying safe zones and evacuation routes in the four EWS communities and at least four additional communities.

Output 4.3: Authorities and local communities trained through simulation exercises and other means as needed.

Indicative activities under Output 4.3 will include:

4.3.1. Capacity building and information activities for EWS calibration and operation for the relevant authorities in conjunction with the EWS provider selected in Activity 4.1.1.

4.3.2. Simulations with authorities and potentially affected population (or portions thereof) based on the EWS and supporting measures (e.g. evacuation routes and safe zones).

Output 4.4: Maintenance and financing strategy developed for ensuring long-term sustainability of the EWS and the expansion of adaptation activities to other vulnerable communities

Indicative activities under Output 4.3 will include:

4.4.1. Elaboration of a maintenance plan in collaboration with the involved authorities

4.4.2. Evaluation of potential internal and external funding sources and financing schemes for ensuring long-term operation of the EWS and other complementary adaptation measures

4.4.3. Development of specific recommendations for scaling up low-cost / no-cost measures to other communities exposed to GLOF risks

4.4.4. Development of a funding plan for the transfer of ownership, funding, maintenance and operation of the EWS and other complementary adaptation measures

Component 5: Knowledge exchange, stakeholder engagement, and communication

This component oversees the development and implementation of knowledge management, exchange, stakeholder engagement and communication activities arising out of components 1 - 4. The primary goal of this component is to ensure that these activities are harmonised across the region, through joint meetings and workshops, knowledge products (e.g. a web platform), and shared resources such as guidelines, policy briefs, and educational and outreach materials). In this manner, implementation of activities will be cost-effective, and duplication of efforts can be avoided.

The project will use the approach of building on *existing* UNESCO and other regional information portals in order to ensure that the information provided will have a sustained, post-project presence on the Internet. It will also share information with other regional information portals that focus on DRR and climate change adaptation to reach a wider audience. Furthermore, the project will develop strategies for ensuring access to information for communities and user groups with low rates of internet connectivity, such as a 3G / 4G option. Participants in the community consultations held during project formulation frequently mentioned text messaging as the means they used for receiving information and warnings about disasters.

Activities conducted under this component must draw on the strengths and diversity of the regional program while being sensitive to local and site-specific requirements, thereby providing the foundation for successful and sustainable adaptation interventions. The project will pay special attention on communication channels for different target groups, which vary by type of media, community influencers, and language; it will also bear in mind that men and women in a given community may use different channels of communication.

Component 5 will encompass the following outputs and indicative activities:

Output 5.1: Web-based knowledge-platform established on GLOF risks and adaptation strategies

Indicative activities under Output 5.1 will include:

5.1.1. Establishment/enhancement of modern, user-friendly, web-based knowledge platforms, where data, maps, information and guidance documents produced under components 1 to 3 and other project reports (workshops, meetings) will be available to stakeholders and authorities as a basis for awareness raising and adaptation planning.

5.1.2. Adoption of a common regional template for the platform, allowing each country to tailor a cost-effective set-up that best suits their local context and needs

5.1.3. Funding and technical strategy developed to ensure long-term maintenance of the knowledge platforms

Output 5.2: Education and training programmes undertaken to equip stakeholders with knowledge and capacity to prepare for, respond to and recover from GLOF disasters

Indicative activities under Output 5.2 will include:

5.2.1. Engagement with national universities in each of the participating countries to ensure knowledge and understanding emerging from this programme is transferred to the next generation of young scientists working in Central Asia, in a form of networking, capacity building and new educational programmes (see also Output 1.3).

5.2.2. Enhancement and fostering of regional collaboration through cost-effective joint training and education programmes (see also Output 1.3).

5.2.3. Implementation of community level training based on common agreed standards and best practices, elaborated according to local experiences and contexts. (see also Output 4.2)

Output 5.3: Knowledge and lessons learned from the targeted demonstration projects disseminated within Central Asia and across other high mountain regions

Indicative activities under Output 5.3 will include:

5.3.1. Scaling-up experiences and lessons learnt for other EWS implementations in CA.

5.3.2. Exchange workshops with authorities from other than CA regions, and communication of outcomes and experiences to relevant institutions across high mountains in Asia, such as ICIMOD, Himalayan University network, DRR Youth network in ASPAC region, STAG and others

5.3.3. Knowledge products (mobile aps, radio spots, infographics, outreach and training material) for communities at risk and to visitors to these communities, adapted to specific audiences ranging from tourists to school teachers and their pupils.

5.3.4. Support extended to organization of scientific conferences in the region.

5.3.5. Education on DRR and CCA promoted at the local level for schools in GLOF-prone regions in the form of educational materials.

Figure 1 on the following page provides an overview of the logic of the proposed intervention and how the proposed activities correspond with the barriers identified in the project scoping process.

	Assess Vulnerability		*Address Vulnerability*		
Actions and Measures	**Strengthening Capacity to Monitor GLOF Risks**	**Policies and Approaches for Vulnerable Communities**	**Development of EWS and On-the-Ground Measures for Sites**	**Targeted EWS Demonstrations**	**Knowledge Exchange and Communication**
	*National and Regional Mapping / Monitoring Strategies *Regional GLOF Atlas for Central Asia *Coordinated monitoring for region	*Exposure mapping and hotspot identification *Vulnerability assessments local risk reduction plans for endangered communities *Mainstreaming DRR / CCA into regional development plans	*New local-to-regional coordination system for EWS *Design infrastructure and training for pilot EWS sites	*Piloting low-cost adaptation measures *Construction, testing, and training for EWS stations *Financing and scaling-up for EWS, other measures	*Web-based knowledge platform *Education and training programs *Dissemination of knowledge, lessons learned
Barriers	*No means of coordination on transboundary GLOF monitoring *Lack of Information on Changing GLOF Exposure Risks *Lack of Regional Coordination on GLOF Monitoring	*DRR authorities lack information to prioritize and address GLOF risks *Communities are not aware of options to reduce and mitigate disaster risk from GLOFs *DRR / CCA considerations are not mainstreamed into sub-national development plans	*Local warning needs are not known to DRR agencies *Endangered communities lack EWS infrastructure *Low coordination between regional DRR practitioners and local / regional authorities on risk reduction	*Communities lack training in preparedness and practical DRR measures *DRR practitioners focus primarily on response. *Lack of financial support for EWS systems	*Lack of communication between researchers and practitioners *Low levels of information /awareness on GLOFs *Good practice is not disseminated
	Lack of Capacity to Identify and Assess GLOF Risks and Threats		*Lack of Capacity to Address Threats in Endangered Communities and Support Adaptation*		

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

This project provides an innovative holistic approach to climate change adaptation in Central Asia, bringing together the latest scientific understanding of glacier changes and related GLOF threats, design of adaptation strategies and implementation of a technologically advanced EWS, and comprehensive strengthening of institutional and societal capacities, including for the most vulnerable communities. The new scientific understanding and baseline knowledge resulting from this program will be centred on state-of-the-art approaches used for monitoring glacier lakes and their surrounding terrain, hazard and risk assessment and adaptation. Project partners from Switzerland bring long-standing expertise in these fields and have been at the forefront of developing modern remote sensing, ground-based, and modelling approaches optimised for regional-scale GLOF hazard and risk assessments, which is essentially lacking in CA national and local institutions. This partnership will ensure that local authorities and institutions are best equipped to monitor and respond to the rapidly emerging GLOF threat. Hazard and risk assessment procedures will be implemented within a modern Geographic Information System (GIS), and integrated within an innovative web-platform that provides user-friendly, intuitive, and interactive access to all stakeholders.

As emphasized in the Sendai Framework, EWS are a key mechanism to achieve DRR and CCA, through reducing societal vulnerability. According to UN standards[9], EWS comprise four inter-related elements as shown below, including detailed process understanding, communication aspects and capacity aspects, spanning far beyond the technical installations of measurement devices.

Figure 4: The four key elements of Early Warning Systems (Source: UNDP, 2018)

This project will implement a technologically advanced EWS that utilizes ground-based sensors and incorporates modern satellite-based earth observation, providing full system monitoring (Monitoring and Warning Component). Latest advances in communication technology will ensure timely and reliable transfer of data and warning services to

[9] Cf. the following documents:

- UN/ISDR 2006: *Developing Early Warning Systems: A Checklist*. Bonn: UN/ISDR Platform of the Promotion of Early Warning (PPEW).
- UNDP 2018: *Five approaches to build functional early warning systems*. United Nations Development Programme.

authorities and the communities. However, experiences have shown that technology needs to be balanced against local capacities, and hence there is heavy emphasis in this project towards education and training of local authorities and communities to ensure long-term success and sustainability of the adaptation measures. In this context it is of vital importance that local schools in GLOF-prone regions are actively involved in the project through learning exercises and also to ensure that parents and the rest of the community are informed about possible GLOFs and DRR measures (Dissemination and Response Capability Components).

Scientific and technological advances in modelling, monitoring and predicting capabilities would bring benefits to early warnings once science is translated into effective DRR actions (Risk Knowledge Component). Bridging the gap between scientific research and decision making will make it possible to fully exploit capacities of EWS technologies for societal benefit. Therefore, existing research networks, including of young researchers, who will pursue filed activities together with experts, will also be supported to allow for synergistic activities and interdisciplinary research. This will improve communication between scientists, and decision-makers, DRR experts, authorities in charge of emergencies and affected segments of the local population. Such coherent initiatives for collaborative action and adaptation to impacts of climate change in mountainous regions of CA, which are planned to be implemented in the project, are lacking in the region. Building capacities in DRR and early warning, as well as the related integration of disaster mitigation strategies into planning and policies, is one of the main recommendations of the UNEP state of the art analysis of EWS from 2012[10].

In recognition of the potential for this innovative project to provide a reference and guidance for broader CCA and DRR activities across Central Asia, the Project Implementation Unit (PMU) will be supported by an Information and Experience Sharing Committee (IESC) (Part III A.). This committee will further contribute towards ownership, high visibility, transparency and improved exchange of knowledge, experiences and information among stakeholder across Central Asia. In the context of Central Asia, the IESC is a real innovation as currently there are no modern/technological mechanisms in place, which lead to a better understanding of DRR caused by GLOFs and climate change.

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 adverse impacts of climate change and particularly water-related disasters are recognized by the United Nations as one of the greatest threats to sustainable development globally. Considering GLOFs, recent disasters highlight the significant direct and indirect economic impacts that these extreme floods can have, and thereby, the corresponding benefits that a well-developed EWS can provide. A 2016 study[11] of global societal impacts from GLOFs revealed that there have been 7 deaths in Iceland, 393 deaths in the European Alps, 5745 deaths in South America and 6300 deaths in high mountain Asia. Around 15% of the GLOF events in high mountain Asia have inundated farmland, destroyed homes, damaged roads and damaged infrastructure. During the 2010

[10] UNEP 2012: *Early Warning Systems – A State of the Art Analysis and Future Directions*. Nairobi: Division or Early Warning Assessment (DEWA), United Nations Environment Programme (UNEP).
[11] Carrivick JL, Tweed FS. 2016. A global assessment of the societal impacts of glacier outburst floods. *Global and Planetary Change*. Elsevier B.V. **144**: 1–16. DOI: 10.1016/j.gloplacha.2016.07.001.

outburst from lake 513 in Peru up to 700 animals were killed[12], significantly impacting the livelihoods of local famers. Major GLOF disasters such as occurred in the Northern Indian village of Kedarnath in 2013, can also have long-lasting indirect influences on the economy as the tourism industry can be negatively impacted for several years[13]. Early warning systems can also prevent damage to critical infrastructure such as hydropower stations, as the warning system allows reservoirs to be shut-down and water-lever lowered in advance of the GLOF. Frequently it is the most marginalised and vulnerable members of societies who live in the most exposed riverside locations, and therefore the approach to hazard and vulnerability mapping employed under Components 1 and 2 of this project will identify such risk "hot spots". Hence, targeted measures implemented in this project that aim to increase societal resilience, reduce vulnerability, and thereby minimise losses to future GLOF events will provide direct and significant economic and social benefits, to those sectors and members of society who are most threatened. From an environmental viewpoint, damage and loss of valuable ecosystem services can be reduced, through GLOF mitigation and sustainable management of floodplain areas. For example, emphasis will be given to the conservation of forested slopes which provide natural flood buffering and protection. In fact, by focussing on the implementation of GLOF EWS, this project provides an environmentally-friendly, and cost-effective adaptation measure that minimise permanent modification of the natural environment. In the design of complimentary measures that include hard engineering options, potential adverse environmental impacts will be carefully assessed and mitigated to the extent possible.

Bridging the gap between scientific knowledge and decision making will make it possible to fully exploit capacities of EWS technologies for societal benefit. The project will also bring indirect economic and societal benefits as a result of strengthened capacities, awareness, and engagement in CCA. For example, the hydro-meteorological and cryospheric monitoring that will primarily serve as a basis for the EWS, will also provide data for improved management of hydrological resources and agriculture. Education around the need for, and importance of an EWS will be framed within a broader context to raise community awareness of climate change and environmental issues. In the process of enhancing disaster preparedness, non-governmental and community-based organizations will benefit from strengthened communication and outreach capabilities, which will be crucial to the successful and sustainable implementation not only of the GLOF EWS, but also broader CCA initiatives. The proposed project would address such crucial shortcomings in disaster preparedness, and thereby significantly reduce societal vulnerabilities to future GLOF events, and ultimately minimise human and economic losses.

Finally, at the policy level, the project will provide an enabling environment for the integration of CCA and risk management considerations into GLOF-affected sectors, such as land use planning, agriculture, forestry and disaster management. The interface between the policy level and local level institutions will be enhanced, in order to ensure evidence-based policy making that is informed by community needs. Involvement of communities and other stakeholders throughout the planning and design to the implementation and monitoring stages of the project will further enhance the economic and social benefits of the project, and it will ensure that communities are empowered to take charge of their own protection from climate-induced risks.

Environmental and Social Considerations

[12]Carey M, Huggel C, Bury J, Portocarrero C, Haeberli W. 2012. An integrated socio-environmental framework for glacier hazard management and climate change adaptation: lessons from Lake 513, Cordillera Blanca, Peru. *Climatic Change*. Springer Netherlands **112**(3–4): 733–767. DOI: 10.1007/s10584-011-0249-8.

[13] Ziegler AD, Wasson RJ, Bhardwaj A, Sundriyal YP, Sati SP, Juyal N, Nautiyal V, Srivastava P, Gillen J, Saklani U. 2014. Pilgrims, progress, and the political economy of disaster preparedness - the example of the 2013 Uttarakhand flood and Kedarnath disaster. *Hydrological Processes* **28**(24): 5985–5990. DOI: 10.1002/hyp.10349.

Environmental Considerations

Implementation of the project, and particularly the EWS, will strictly adhere to local environmental policies and best practices. A typical GLOF EWS does not contribute towards any foreseeable negative environmental impacts. It is important to note that *the project as designed will not involve construction or earthworks that would be subject to an environmental impact assessment.* The adaptation measures in addition to the EWS are instead focused on hazard zone demarcation and the identification of evacuation routes and safe zones.

Social Considerations

On the societal level, early engagement of the community and other stakeholders during the project preparation period has ensured that the needs, expectations and wishes of the community were addressed. The community consultations were conducted in such a way so that each step of the project implementation is complemented by the outcomes of these consultations with specific indicators to be jointly developed. Community leaders and women's group leaders participated in the organized meetings. Furthermore, consultation in affected communities will be ongoing throughout project implementation.

Gender. As women and men are affected differently by disasters and climate change, in particular due to the higher likelihood of women to be living in poverty, their different vulnerabilities and capacities will be analysed, and their gender-specific concerns and priorities will be addressed. In DRR, women "typically face greater mortality, health risks, and domestic and sexual violence in hazard events…." and may face greater challenges to accessing social protection mechanisms such as insurance and safety nets."[14] The same study suggested "Increasing access to information and participation in risk management and early warning systems. During the project, women will be recognized for their resilience in the face of disaster and for the roles they play as active agents of change in helping communities to recover and adapt. The policy-related work is designed to contribute to gender equality by improving the balance of power between women and men in Central Asia to improve adaptation and resilience to climate change, thus contributing to SDG 5 of the 2030 Agenda.

Gender equality varies substantially across the region. For example, when measuring countries by their score on the Gender Development Index (GDI), Kazakhstan is ranked 56th globally, while Kyrgyzstan, Uzbekistan and Tajikistan are ranked 84th, 105th, and 129th, respectively.[15] However, vulnerable communities in the region, especially in rural and mountainous areas, face common issues: women are responsible for maintaining households due to the outmigration of the working population, primarily men, in order to earn money in cities and abroad. The overall percentage of women in the villages participating in the community consultations ranged from 49% to 62%, while the percentage of working-age women to working age men was higher (see Annex 2).

While a majority of participants in the community consultations had a positive view of women's participation in community decision-making, the project will consider potential barriers to participation, particularly given women's roles in maintaining households and in child rearing (see Annex 3). Therefore, in the course of the project it will be essential to support and increase women's participatory and leadership role in addressing GLOFs risk reduction in their communities. Women consultants will be used to obtain information in women-only community meetings if necessary,

[14] GFDRR 2016. Gender Action Plan: 2016-2020. Fall 2016 Consultative Group meeting. Washington: GFDRR: 5.
[15] UNDP 2017. Human Development Data. hdr.undp.org. Accessed May 2, 2019.

During the project preparation phase, community consultations were used to gauge women's roles in potential pilot communities and explore the best means for involving and communicating with women and men. Of the 247 participants in the community consultations, for example, 38% were women. National machineries for the advancement of women and women's NGOs were involved in the stakeholder consultation, and an initial gender assessment and gender action plan for project implementation, which is included as Annex 3, addresses these issues in greater detail. Finally, the Full Proposal has been reviewed by the gender focal point at the UNESCO Natural Sciences Sector, HQ and the Cluster Office for Central Asia.

Indigenous Peoples and vulnerable groups: The project will also pay special attention to the most vulnerable communities, namely, indigenous and ethnic minorities in mountainous areas, by developing evidence-based adaptation practices. The project region is home to many indigenous cultures as well as ethnic minorities, which often belong to socially-disadvantaged groups. In Tajikistan alone, for example, the Pamir region is inhabited by Shughnis, Rushanis, Wakhis, Yazgulyamis, Ishkashimis and other groups (Gunt Valley and Shakhdara River valley) while another minority, Yaghnobi people inhabit Zeravshan valley. These communities are most directly affected by the climate change impact on glacier melting, which has resulted in frequent and vast mudflows, property damage, and the destruction of irrigation channels.

Community consultations during the project preparation period assessed the prevalence of vulnerable community groups, including the elderly (approximately 10% of populations of the 20 communities consulted), vulnerable children, women-headed households (nearly 10% of the pilot communities in Uzbekistan), and community members with disabilities. The vulnerability assessment under Component 2 will be carried out in close consultation with and involvement of these community members in each participating country to assess the existing exposure of households, ensuring that the most vulnerable groups in the most exposed locations receive the most benefit from the project.

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 cost-effectiveness of the proposed project was assessed in two ways: 1) A cost-effectiveness analysis of the project approach;[16] and 2) an assessment of the efficiency and cost-effective aspects of project management.

Cost effectiveness of the proposed approach

Baseline Costs

The damage caused by GLOFs under a "do-nothing" scenario can be very high, not only for primary damage (loss of life, damage to infrastructure, buildings and agricultural land), but also secondary effects (e.g., disruption of primary transportation routes, energy supply, tourism decline, and the economic isolation of entire regions). A prime example of this multi-faceted damage occurred in the July 2015 mudflow in the Gorno-Badakhshan Autonomous Oblast (GBAO) of Tajikistan, where 80% of the communities in GBAO lost electricity due to infrastructure damage, and a temporary lake threatened downstream hydropower plants and infrastructure, including in a neighbouring region.

[16] This analysis was informed by UNFCCC (2011) *Assessing the Costs and Benefits of Adaptation Options: An Overview of Approaches.* Bonn: UNFCCC.

Relief and rehabilitation costs related to GLOF disasters normally vastly exceed the cost of DRR measures, in particular if secondary damages are considered as well. Hence, the implementation costs of EWS can be significantly outweighed by the direct avoidance or reduction in damages caused by a GLOF event.

Intervention Costs

It is generally accepted that a DRR approach to GLOFs is more cost-effective than the baseline of disaster response and remediation. However, measures that are available under a "do something" scenario vary widely in cost. The costliest measure would be resettlement, which would also involve unacceptable amounts of social and economic disruption in affected communities. The next most costly measure would be community infrastructure retrofitting, which would be prohibitively expensive due to the need to retrofit in proximate communities and in downstream areas. In addition, retrofitting would still leave community members vulnerable to loss of life in the event of a GLOF. The next most expensive set of measures in terms of economic costs would be targeted infrastructure work, such as artificial drainage construction work or protective dams, which have been employed in Almaty.

EWS is commonly agreed upon as the most effective initial approach to DRR in communities that are exposed to GLOFs. Remote sensing can provide a means of tracking glacial lake formation and hot spots. Capacity building in exposed communities, including community monitoring to complement remote sensing efforts, is even less expensive and generates social benefits of community empowerment. Finally, low-cost / no-cost measures such as hazard zone demarcation, the identification of evacuation routes and safe zones, and the management of drainage channels represent the least expensive option.

Given the relative costs and benefits of possible DRR measures, the project has selected the three least-expensive interventions (EWS, capacity building, and low-cost / no-cost measures), which in combination will generate significant benefits in the form of increased safety and significant cost avoidance.

Cost-Effective Aspects of Project Management

On the implementation level, the regional approach of the program will enable methods and approaches to be replicated across countries, with lessons learned and best practices shared between partners. The hazard and risk assessment in Component I will be based on freely available remotely sensed imagery and datasets, using techniques that have been optimised for regional-scale applications. Following the identification of risk hot spots adaptation resources can then be targeted to the most critical locations, and implementation tailored to the local environmental and societal context. Tangible outputs emerging from the program (e.g., guidance documents, policy briefs, education and training materials, web portal) will be based on common templates, which are subsequently fine-tuned for each country, minimising the duplication of efforts and enhancing the cost-effectiveness of program implementation. Remote sensing is considered as the most effective first phase approach in GLOF risk reduction and preparedness. Under this project it will facilitate rapid and complete coverage of large and extremely remote mountainous areas, thus allowing to identify potentially dangerous localities, including at trans-boundary level, for closer study. In this manner, time and expense are reduced.

Where possible, links to existing regional programmes and activities will be established and strengthened. The project will utilize existing national institutions, NGOs working locally, including Aga Khan for Habitat (AKAH) in Tajikistan, which will reduce transaction

costs. The project will make use of these already established projects, thus diversifying financial risks and increasing financial flexibility.

Furthermore, the integrated EWS implementations to be elaborated in this project can draw on the experience gained by the partners from the University of Zurich over the past several years in the Andes of South America, where pioneering GLOF EWS have been designed and implemented. This expertise is complemented by long-lasting experience in cryosphere monitoring with different techniques in many mountain regions worldwide, including glaciers in the Pamir and Tien Shan. In both South America and Central Asia, the University of Zurich serves as a long-term strategic partner with the Swiss Agency for Development and Collaboration (SDC). Integrating this know-how, directly into the proposed Central Asia project, including the experience in capacity building for the academic, public and private sectors, brings significant benefits and enhances cost-effectiveness.

In addition to the cost-effective benefits relating to the EWS, emphasis in this project is given to capacity building and training at multiple levels of society; these elements are incorporated into all of the project components. These relatively low-cost activities represent classic “no-regret” adaptation responses, which will bring immediate benefits to the communities, while also offering benefits over a range of possible future scenarios. In other words, even if in the best-case scenario a particular EWS is never activated by a GLOF event, the implementation and associated capacity building process will have led to a significant reduction in vulnerability of the threatened communities. As a by-product, the community builds awareness and resilience not only in relation to GLOFs, but more generally in relation to climate-driven changes and related hydro-meteorological threats. At the institutional level, regional workshops will provide a cost-effective opportunity to build and enhance collaboration across Central Asia, strengthening the capacity of the region to respond to the emerging threats of climate change, and particularly those related to the cryosphere. Engagement with local universities to ensure knowledge and understanding emerging from this programme is transferred to the next generation of local scientists working in CA is also a sustainable way of addressing knowledge on GLOF risks for future generations. Finally, outreach through schools will raise awareness among pupils and their families.

In conclusion:

- Using a DRR approach will reduce the substantial economic and social costs of GLOFs in the participating countries
- The proposed intervention is less costly than other possible approaches considered
- The development and application of coherent methods, procedures and activities across the region will strongly increase the cost-effectiveness, i.e. the impact per unit of investment, will thus be clearly larger as compared to a local or national effort.
- The application of good practices from similar communities in other regions will also contribute to the cost-effectiveness of the intervention

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 proposed activities under this project are aligned with key national strategies and plans and also with country commitments to multilateral environmental agreements. None of the participating countries has adopted a national strategy or concept on climate change

adaptation; however, adaptation strategies are under development in several countries or have been developed but not endorsed.

In Kazakhstan, the proposal is aligned with the following national strategies: Kazakhstan 2050, the Strategic Development Plan of the Republic of Kazakhstan until 2025 (2017), the state programme for water resources management in Kazakhstan 2014-2020, and the Concept of Kazakhstan on Transition to Green Economy. In Kyrgyzstan, the project is aligned with the National Development Strategy of the Kyrgyz Republic for 2018-2040, including the priority directions for the development of the Kyrgyz Republic for 2023, which was endorsed by the National Council for Sustainable Development of the Kyrgyz Republic in 2018. In Tajikistan, the project is aligned with the National Development Strategy (NDS) of the Republic of Tajikistan 2030, the National Action Plan of the Republic of Tajikistan for Climate, the National Environmental Action Plan of the Republic of Tajikistan (NEAP, adopted in 2006), the National Action Plan of the Republic of Tajikistan on Climate Change (2003), the National Disaster Risk Reduction Strategy for 2019-2030 (2018), and the State Program for Monitoring and Preservation of Glaciers until 2030. In Uzbekistan, the project is aligned with the National Development Strategy 2017-2021.

Furthermore, the project is aligned with the 2030 Agenda for Sustainable Development (applicable to all countries), the UNFCCC (signed by all countries), and the UNECE Convention on Access to Information, Public Participation in Decision-Making, and Access to Justice in Environmental Matters (Aarhus Convention), which has been signed by Kazakhstan, Kyrgyzstan, and Tajikistan. Finally, Kazakhstan and Kyrgyzstan have appointed Sendai Framework focal points.

D. *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, sector strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.*

The project proposal has been prepared in accordance with prevailing National Sustainable Development Strategies and Adaptation Plans. A wide range of relevant national development programs and plans of participating regions were studied to identify the countries' main priorities and needs in the field of CCA, which forms the basis of the project concept. The provisions of the following documents were considered during the elaboration of the concept:

Kazakhstan:
- Kazakhstan 2050 Strategy;
- National Communications to the UNFCCC (III-VI and VII).

Kyrgyzstan:
- National Sustainable Development Strategy of the Kyrgyz Republic for 2013-2017;
- Program of the Kyrgyz Republic on Transition to Sustainable Development for 2013-2017;
- Priorities for Adaptation to Climate Change in the Kyrgyz Republic till 2017.

Tajikistan:
- National Action Plan for Climate Change Mitigation;
- National Communication of the Republic of Tajikistan under the UN Framework Convention on Climate Change.

Uzbekistan:
- National Strategy of Sustainable Development of Uzbekistan.

In addition, current country activities on adaptation that are relevant to climate change adaptation were reviewed during project formulation. In *Kazakhstan*, the country's Nationally Determined Contribution (NDC) under the Paris Agreement does not address adaptation. However, the country has received readiness funding under the Green Climate Fund that will include support for the following activities: "Strengthen knowledge, capacities, processes, systems and procedures for Climate Change Adaptation within… relevant key stakeholders, including the Ministry for Agriculture, Ministry for Health Care and Social Development, Ministry for Investment and Development, Office of the Prime-Minister and the local authorities, to enable them to fully comply with its role."[17]

The NDC submitted by *Tajikistan* includes language on climate change adaptation. Specifically, the country states its intention to reduce the impacts of dangerous weather events by implementing a set of policies that include the State Programme for Study and Preservation of Glaciers of the Republic of Tajikistan for 2030, the National Strategy for Disaster Risk Management of the Republic of Tajikistan, and the National Plan for Emergency Preparedness and Response.[18] The NDC also states the country's intention to reduce "vulnerability to the impacts of climate change by means of full-scale integration of the climate resilience and adaptation measures into the planning and development of the green infrastructure" in areas that include resilience to hydrometeorological hazards, disaster risk reduction, and glacier monitoring.[19] Tajikistan has developed a National Adaptation Plan for 2016-2030 that focuses on the integration and mainstreaming of DRR planning and adaptation planning; the plan is awaiting government approval. In January 2018, the country received a readiness grant from the Green Climate Fund to support the identification of priorities for adaptation projects.

The NDC submitted by *Uzbekistan* states the country's intention to continue its efforts in capacity building to support adaptation. It establishes climate change adaptation as a priority direction, and the NDC specifically identifies "Development of early warning systems about dangerous hydrometeorological phenomena and climate risk management" as a priority activity under "Adaptation of social sector to climate change."[20]

Relevant national strategies on DRR in the region were also considered, including the National Strategy for Comprehensive Safety of Population and Territories of the Kyrgyz Republic from Disasters and Emergencies; National Disaster Risk Management Strategy of the Republic of Tajikistan 2019-2030, and the State Programme of Uzbekistan on Forecasting and Preventing Emergency Situations. The DRR strategies of the CA countries are primarily in line with the priorities of the Sendai Framework, which also was instrumental for the project development. The Sendai Framework, which succeeded the Hyogo Framework of Action was adopted by UN Member States, including Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, on 18 March 2015 at the 3rd World Conference on Disaster Risk Reduction. As a result of this Conference, the CA countries issued a joint regional statement, where the governments of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan confirmed their commitments to the implementation of the Sendai Framework, emphasizing the need to consolidate the efforts of all interested parties, including international organizations, to foster regional cooperation in DRR. The Sendai Framework has become the accepted approach in dealing with DRR in Central Asia, and Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan have all committed to the use of the Sendai Framework Monitor to improve disaster loss data collection. This step is consistent with

[17] GCF Readiness Proposal (2017): 5.
[18] Intended Nationally Determined Contribution (INDC) towards the achievement of the global goal of the UN Framework Convention on Climate Change (UNFCCC) by the Republic of Tajikistan (2015): 2.
[19] Ibid.: 2-3.
[20] Intended Nationally Determined Contribution (INDC) of the Republic of Uzbekistan (2017): 6.

the Plan of Action for the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 and its milestones for the period of 2016-2020 in Central Asia and South Caucasus region.

In their national statements on DRR, the governments of Kyrgyzstan and Tajikistan have highlighted water-related disasters. Considering their prevailing transboundary effects, cooperation between the countries of the CA region was recognized as the only rational way to address water-related disasters and risks associated with them. The need to increase the resilience of populations, communities and countries to disasters, especially water-related disasters, was emphasized as one of the main focuses in implementing the Sendai Framework. Strengthening global and regional cooperation in DRR was recognized as crucial for the region.

Finally, Kazakhstan, Kyrgyzstan, and Tajikistan are parties to the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice (the Aarhus Convention). Project activities are consistent with the provisions of the Convention, such as elements that support environmental education increased awareness of environmental information.

The proposed project is also highly aligned with the priorities of participating countries regarding development cooperation. The following table summarizes the corresponding priority outcomes in country planning frameworks.

Table 2: Corresponding Development Priorities by Country, UNDAF[21]

Country	Priority Area	Outcome	Indicator
Kazakhstan	Pillar 1: reduced disparities and improved human development	Outcome 1.3: Ecosystems and natural resources protected and sustainably used, and human settlements resilient to natural and manmade disasters and climate change	Indicator 1: Percentage of settlements and cities that have implemented resilience-building measures as per international recommendations (Sustainable Development Goals, and Sendai Framework for Disaster Risk Reduction)
Kyrgyzstan	Environment, climate change, and disaster risk management	Outcome 3: By 2022, communities are more resilient to climate and disaster risks and are engaged in sustainable and inclusive natural resource management and risk-informed development	Indicator 3.1 Existence of national and local disaster risk reduction strategies, adopted and financed, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030 (11.b.1;11.b.2)
Tajikistan	Resilience and Sustainability	Outcome 6: People in Tajikistan are more resilient to natural and man-made disasters and benefit from improved policy and operational frameworks for environmental protection and sustainable management of natural	Indicator 6.5. Emergency Preparedness Capacity Index Indicator 6.6. Number of disaster impact alleviation plans and policies (at all levels) Indicator 6.8. proportion of rural communities with increased capacity to manage shocks and risks

[21] *Sources:* Partnership Framework for Development, Kazakhstan, 2016-2020; UNDAF for the Kyrgyz Republic 2018-2022; UNDAF for Tajikistan: 2016-2020; Uzbekistan UNDAF: 2016-2020.

		resources	
Uzbekistan	Environmental Protection, to ensure sustainable development	Outcome 6: By 2020, rural population benefit from sustainable management of natural resources and resilience to disasters and climate change	Indicator 6.8: % of rural communities in disaster prone areas are able to apply proactive disaster risk reduction activities (including through modern ICT) according to HFa and post-HFa framework

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 EWS will build on international standards regarding climate change adaptation activities, including the components of i) understanding risks, ii) monitoring and alert, iii) communication, iv) response. The project is in full compliance with the Environmental and Social Policy of the Adaptation Fund (see Section II.L and Section III.C).

The project concept is also in line with relevant national laws and standards of environmental protection, human safety and protection from the natural hazards, including the following:
- Civil Defense Law of the Republic of Kazakhstan (1997);
- Law of the Kyrgyz Republic on Civil Defense (#54 from 24 May 2018);
- Law providing for legal conditions of disaster management of the Republic of Kazakhstan (1993);
- ST RT GOST R 14031-2010 – National standard of Tajikistan: Environment management. Assessment of ecological efficiency. General requirements;
- O'z DSt 1016:2002 – National standard of Uzbekistan: Safety in emergency situations. Monitoring and forecasting of emergency situations. Main provisions;
- O'z DSt 1017:2002 - National standard of Uzbekistan: Safety in emergency situations. Monitoring and forecasting of emergency situations. Damaging factors. Nomenclature of the parameters of damaging effects;
- O'z DSt ISO 14001:2009 - National standard of Uzbekistan: Environment management. Technical conditions and guidelines for use;
- Model Act on International Disaster Assistance through the Inter-Parliamentary Assembly of the CIS (2014 -- regional).

In addition, the project acknowledges the laws and regulations in Central Asia regarding environmental impact assessment:

- KAZ: Law of the Republic of Kazakhstan of 21 October 2000, No. 86-II "On the Adhesion of the Republic of Kazakhstan to the Convention on Environmental Impact Assessment in a Transboundary Context"
- KAZ: Law of the Republic of Kazakhstan "On the Protection of the Environment"
- KAZ: Law of the Republic of Kazakhstan "On Environmental Expert Review"
- KYR: Law of the Kyrgyz Republic of 12.01.2001, No. 6 "On Ratification of the EIA Convention" in the Kyrgyz Republic;
- KYR: Instruction on Environmental Impact Assessment (EIA) Procedures for Proposed Activities in the Kyrgyz Republic;
- KYR: Law on Ecological Expertise (State Environmental Review) 1999 (2003, 2007)
- TAJ: Law on Environment Protection (2012)
- TAJ: Law on the State Ecological Expertise (2012)

- TAJ: Procedure of Environmental Impact Assessment (adopted by the Resolution of the Government of the Republic of Tajikistan No. 509 as of 01.08.2014)
- TAJ: Procedure to implement State Ecological Expertise (approved by the Resolution of the Government of the Republic of Tajikistan No. 697 as of December 3, 2012)
- TAJ: List of objects and types of activity for which preparation of documentation on Environment Impact Assessment is mandatory (adopted by the Resolution of the Government of the Republic of Tajikistan No. 253 as of June 3, 2013)
- UZB: Regulation on State Environmental Expertise, Resolution of the Cabinet of Ministers No. 491, 31 Dec 2001

If the complementary adaptation measures that will be designed under Output 2.2 and implemented under Output 4.2 involve activities that necessitate an EIA (e.g. significant earthworks), the project will comply with all relevant legislation. All construction or earthworks undertaken under project activities will conduct all necessary assessments and obtain all required permits.

There is also some specific guidance in participating countries regarding dam construction and GLOFs.

- In Kazakhstan, significant earthworks or work related to drainage channels would fall under the following sections of the construction code: Complex 1.02: Engineering Surveys for construction and design (Basic Provisions: 1.02-18-2004); Complex 2.03: Protection Against Hazardous Impacts (Engineering Protection in the Areas of Flooding: SNiP RK 2.03-10-2002); and Complex 3.04 (Waterworks: SNiP RK 3.04-02-2008; Dams from Soil Materials: SNiP RK 3.04-02-2008; and Loads and Impacts [of ice] on Hydrotechnical Structures: SNiP RK 3.04-40-2006). In addition, Kazselezashchita, the government agency responsible for mudslides, avalanches, and landslides, has internal, proprietary documentation, including a standard approach for GLOF drainage, internal guidance on the mudslide observation and risk assessment.
- In Kyrgyzstan,the appropriate reference document is the “Procedure for Determining Flood and Mudflow Zones during Outbursts of Mountain Lakes.”[22]
- In Tajikistan, construction and/or earthworks is covered by Building Norms and Rules of the Republic of Tajikistan (ISS Th 11-01-2005 “Composition and procedure for the development, coordination and approval of project documentation for the construction of enterprises, buildings and structures”). These norms also address a range of issues at the design stage of investments.
- In Uzbekistan, the relevant regulations that would apply are a part of building codes: SNiP 2.01.15-90. Engineering protection of territories, buildings and structures from open geological processes.[23]

In cases where afforestation for slope stabilization is used as a complementary measure, a permit or review process will not be required.

At present, both Kazakhstan and Kyrgyzstan are signatories of the UNECE Convention on Environmental Impact Assessment in a Transboundary Context (the Espoo Convention).The project also acknowledges that legislation and regulations may be enacted in the course of project implementation that will update legal requirements involving EIAs and other related measures (e.g. draft legislation that has been developed in Kazakhstan with the support of UNECE, and the government of Tajikistan has recently analyzed the alignment of its legislation with the Espoo Convention, also with UNECE). All construction or earthworks

[22] Erokhin, S.A., et. al. *System of regulatory documents in the construction domain SP 22-02-01.* Bishkek: 2001 [in Russian].
[23] Design Fundamentals, 1991 [in Russian].

undertaken under project activities will conduct all necessary assessments and obtain all required permits.

The project manager will work with the National Execution Teams and government stakeholders to monitor all relevant legislative and regulatory developments in order to ensure that all project activities comply with legislation that is in force. Additional information on safeguarding activities to comply with relevant legislation and regulations is provided in Sections II.L and III.C.

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

At present, there is no national level project in any of the Central Asian countries which exclusively addresses the need for ground-level work on GLOF risk reduction, nor is there a regional project focusing on GLOFs. Even after comprehensive analysis of various water-hazard-related activities, the risk of duplication can be assessed as zero.

Therefore, this UNESCO-AF project will be the only regional initiative addressing GLOFs within the full context of CCA, extending from baseline knowledge and capacity building, monitoring and anticipation, through to development and implementation of adaptation strategies. The funding required from the Adaptation Fund thus will enable the implementation of first project in Central Asian countries with a tangible, science-, community- and evidence-based GLOF risk reduction effort.

The UNESCO-AF project will work to ensure that the assessment of GLOF hazards and risks, and the associated implementation of adaptation strategies, draw upon the best available hydro-meteorological and cryospheric baseline data from the region, and from existing knowledge platforms. Networking with global and regional research and resource centres working on GLOF issues will be established to institutionalize a well-connected knowledge base and analytical framework. As described under Component 1 of this proposal, synergies and links will be established with the following ongoing and planned projects in relation to glaciers, glacier melting-related risks, and climate change adaptation:

"Climate Adaptation and Mitigation Program for the Aral Sea Basin (CAMP4ASB): (World Bank, 2015-2021; project cost: USD 44.78 million). CAMP4ASB does not cover risks associated with GLOFs and the establishment of EWS, but rather focuses on enhancing regionally-coordinated access to improved climate change knowledge services for key stakeholders (e.g., policy-makers, communities, and civil society) in Central Asian countries by establishing regional climate knowledge services. The project aims to provide technical assistance, as well as minor public works, goods (including software and equipment), and training, at both the regional and national levels, to develop a unified, integrated regional analytical platform for climate-resilient and low emission development, with improved data, information, knowledge, and decision-support tools. Component 5 of the UNESCO-AF project may be able to utilize knowledge platforms developed under the CAMP4ASB project for the dissemination of GLOF-related information and project lessons learned, but the CAMP4ASB project will not have access to this type of information in the absence of the proposed UNESCO-AF project.

"Central Asia Hydrometeorology Modernization Project (CAHMP): (World Bank, 2011-2021; project cost: USD 27.7 million). CAHMP is designed "to improve the accuracy and timeliness of hydromet services in Central Asia, with particular focus on Kyrgyz Republic and Republic of Tajikistan."[24] The first component of the project, which is designed to ensure that countries in Central Asia can share, use, exchange, and archive common hydromet data and information, is highly relevant to the UNESCO-AF project for its

[24] http://projects.worldbank.org/P120788/central-asia-hydrometeorology-modernization-project?lang=en

activities on data collection and hazard forecasting. Two activities that will be undertaken in Kyrgyzstan are directly relevant to UNESCO-AF project activities include Activity B.2.4, which creates an automatic monitoring system for previously identified and assess high-mountain lakes with GLOF potential (USD 500,000) to provide on-line data on the state of high-risk lakes; and Activity B.2.5., which will create a mobile response unit to monitor high-risk lakes, glaciers, and mudflow hazard sites (USD 100,000). These activities and activities under the third component, which involves technical assistance to strengthen the capacity of the hydromet service in Tajikistan, will work in tandem with the UNESCO-AF project, and the project will coordinate training and capacity-strengthening activities with CAHMP to avoid overlap or duplication. The UNESCO-AF project will utilize the CAHMP project's assessments where possible to avoid duplication, and it will liaise with the project management in order to identify which data can be utilized.

"Strengthening the resilience of Central Asian countries by enabling regional cooperation to assess high altitude glacio-nival systems to develop integrated methods for sustainable development and adaptation to climate change": (UNDP-GEF, under development; project cost: appr. USD 6.2 million). The proposed project, which will be executed by UNESCO, currently involves Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan, although Kyrgyzstan may also participate. The project has five components, and it focuses very broadly on glacio-nival systems and is expected to result in advances in knowledge about the impacts of climate change on glacio-nival systems in Central Asia and national and regional policies and strategies to address these impacts. The UNDP-GEF and UNESCO-AF projects are complementary: the UNDP-GEF project will generate research findings and high-level institutional capacity that will benefit the UNESCO-AF project. At the same time, the UNESCO-AF project will be able to contribute specific knowledge and capacity-strengthening related to glacial lakes and GLOFs. The UNESCO-AF project will coordinate closely with the UNDP-GEF proposed project in the following ways:

- Under UNDP-GEF Component 1, it will contribute data and project findings to the database on glacio-nival systems and permafrost for Central Asia;
- Under UNDP-GEF Component 2, the UNESCO-AF project will contribute findings from its atlas of glacial lakes to the broader catalogue of the status and changes of glacio-nival systems in the regions, and it will utilize research on the vulnerability of glacio-nival systems where relevant; The UNESCO-AF project will benefit from strengthening of the national and regional glacial centers, and it will coordinate closely with the project on the development of a regional Strategic Action Program on glacio-nival systems that can support institutional coordination in areas including glacial lake monitoring.
- Under UNDP-GEF Component 3, the UNESCO-AF project will provide input on monitoring protocols and on national monitoring programs for glacio-nival and permafrost monitoring.
- Under UNDP-GEF Component 4, the UNESCO-AF project will benefit from findings from demonstration projects in each of the participating countries on best practices in integrated management. It should be noted that the UNDP-GEF demonstration projects focus on mountain ecosystems rather than communities, and so it is expected that the activities the two projects will not overlap, but rather will provide helpful findings that may enhance results.
- Under UNDP-GEF Component 5, which focuses on information dissemination and awareness-raising, there are several activities where the projects could benefit from coordination on knowledge sharing and training.

"Debris flow and outburst flood hazard in Tian Shan under impact of changing climate (DEFenCC)" (SCOPES initiative; project cost: approximately USD 200,000) The DEFenCC project, which recently ended, was led by the University of Bern, Switzerland, and aimed primarily at improving the understanding of past and current GLOF and debris-

flow processes at case study sites in the Tien Shan Mountains. Linkages between the Swiss university partners and participating experts from scientists from the Russian Federation will ensure that relevant scientific findings emerging from the findings of the DEFenCC project will feed into this larger, adaptation-focused project. This project finished in 2018.

"Climate Services: Enforcing and utilizing baseline data for DRR and WRM in Central Asia" (Swiss Development Cooperation, 2017-2020), project budget: CHF 800,000). Partnership will be established with this project, which is implemented by the World Glacier Monitoring Service (WGMS) and the University of Fribourg in Central Asian countries. Cooperation with UNESCO is already foreseen in the capacity development of young women and girls in glaciology and the development of education modules for universities. The UNESCO-AF project could also benefit from data obtained in the course of this project, thus linking it with Components 1 and 2 of the proposal. The UNESCO-AF project will liaise with this project in order to disseminate the educational materials that it produces, including through ministries and its network of universities.

Other UNESCO Projects: Linkages will also be established with two other ongoing UNESCO efforts at the global level: i) The impact of glacier retreat in the Andes: International Multidisciplinary Network for Adaptation Strategies, for exchange of information including links with the Snow Glacier Networks; and ii) Addressing Water Security: Climate Impacts and Adaptation responses in Africa, Asia and Latin America/Caribbean, on knowledge management, as well as sharing the experiences of this project with other similar initiatives in participating countries, the wider region and the international community.

"Regional Project on Ecosystem-based Adaptation (EbA) to Climate Change in high mountainous regions of Central Asia" (GIZ as part of the International Climate Initiative, or IKI, 2015-2020). The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative, and the project is under implementation in Tajikistan, Kyrgyzstan and Kazakhstan in close cooperation with government partners and other development partners. The concept of EbA aims to increase the resilience of people reliant upon services provided by nature, by addressing the degradation of ecosystems and thereby reducing their vulnerability to climate change. The project's objective is therefore to test innovative and cost-efficient climate informed approaches and strategies for EbA, also addressing institutional, economic, technical and informational barriers. In the framework of the project, an EbA method has been developed based on piloting experiences in small watersheds in At Bashy (Naryn, Kyrgyzstan) and Bartang (GBAO, Pamir, Tajikistan). In order to scale up the method at national level, replication of the method is needed for fine tuning. The replication will be done until mid-2020. The proposed UNESCO-AF project will exchange information on good adaptation practices with this GIZ regional project.

Relevant country programming: "Tajikistan: National Disaster Risk Management Project," is a USD 10 million project that is funded by the Asian Development Bank (ADB). The project, which was launched in 2018, is designed to reduce economic losses in Tajikistan from natural hazards by mainstreaming DRM into government institutions and strengthening capacity to manage natural hazards and minimize losses. The ADB project will also involve the development of a roadmap for DRR financing, which will be important to Output 4.3 of the UNESCO-AF project.

Finally, the project has already established linkages with *community-level projects* in the participating countries. For example, the project will communicate with the AKAH in Tajikistan, which implemented a remote geohazard capacity building and monitoring project in 13 communities in Zaravshan Valley in Tajikistan. This team will be a crucial partner in collaborating in activities under Components 2 and 4 in Tajikistan.

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

Knowledge is defined as the understanding of reality based on people's experience, analysis and exchange. In the context of the proposed project, knowledge is recognized as the key to adapt successfully to climate change in the mountainous areas of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. This knowledge has to be created, co-produced, compiled and made available for stakeholders and the interested public.

As described in Section A of Part II of this document, the project will develop an internationally, regionally, nationally and locally institutionalized knowledge base and analytical framework for long-term tracking and management of GLOF and related climate change risks in the target countries. A result-based KM system will be designed and implemented in consultation with all stakeholders using the latest technical expertise. A KM platform needs to tailored to the local context and is a strategic part of the project. It reflects the activities and outputs all five components of the project. Clear mechanisms to manage knowledge and share/disseminate experiences need to be defined and created from the beginning. These mechanisms need to be institutionalized at a national and regional level such that the benefits of the regional cooperation are sustainable.

Guiding principles and objectives for the KM system are:
- Keeping track of experience gained, presenting global, national and especially local knowledge on CCA with special reference to GLOFs, what kind of interventions work, identification of learning objectives and indicators;
- Develop an enabling environment for sharing the climate change knowledge amongst the CA stakeholders;
- Establish a climate change KM coordination framework, which engages all stakeholders;
- Develop the capacity of the coordinating unit to effectively lead the management of GLOF/climate change knowledge;
- Develop and implement a mechanism for monitoring the application of GLOF/climate change knowledge by policy makers and people at the frontline of climate change impacts;
- Maintain a robust and up-to-date GLOF/climate change KM system.

The KM system is a central part of the overall communication strategy of the project. It has to be developed with the participation of all project partners and stakeholders to identify the needs and capabilities of everybody directly involved and of all relevant target groups (media, politicians, public). The aim is to get strong identification with the project, to develop ownership and have a high visibility, which will eventually lead to sustainability.

As a regional project there will be challenges from a language standpoint (English, Russian, Kazakh, Kyrgyz, Tajik, Uzbek), as well as from a technological standpoint (web-based, multi-media, radio, TV, print). It will be crucial to communicate effectively and efficiently. Therefore, a communication strategy for the project will be developed and implemented, which will highlight dissemination of project experiences to communities, educational institutions, NGOs, Civil Society Organizations, private sector institutions with a stake in the issue, and the larger public. This strategy will detail the use of print and electronic media and other communication channels (roundtables, participative community workshops, posters, brochures, booklets, pamphlets, news articles, radio and TV broadcasts, and web-based items). Lessons learnt from the project will be provided via a number of national, regional and international communication channels to increase their outreach (including radio and TV news pieces). This will enable adoption of project experiences in the up-scaling of EWS and other response strategies outside of the immediate project area.

In addition, the project website will serve as a workspace to be shared by project experts and stakeholders. Awareness campaigns through social media to the public and available communication tools for reaching the most remote populations are planned. Highest priority will be given to sustainability. Web site/resources beyond the duration of the project must be maintained. This can be achieved through a strong involvement of national governments, regional institutions and NGOs, including an approach that builds on existing information platforms and resources.

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.*

Context

The proposed project emerged from a multi-year dialogue with countries in Central Asia. The declaration of the International conference on water-related natural disaster reduction, held in 2008 in Dushanbe, stated that research on the impacts of climate variability and change on water related disasters should be increased, in particular with the aim to develop adaptation strategies and mitigation measures. Water scarcity coupled with climate change related disasters was also recognized as a critical challenge in the CA region during the high level international conference on the implementation of the "Water for Life" decade, held in Dushanbe in June 2015.

Similarly, UNESCO with partner agencies such as the UN Centre for Preventive Diplomacy in Central Asia (UNRCCA), the World Bank, International Fund for Saving the Aral Sea (IFAS) in 2013 started an initiative on *"The Impact of Glaciers Melting in Central Asia on National and Trans-Boundary Water Systems"*, bringing together scientists and policy makers to discuss the issue of climate change and agree on a joint roadmap. During the international seminar in Almaty, Kazakhstan, April 2013, it was highlighted that natural disasters like landslides and GLOFs will affect the socio-economic development of the region.

In a follow-up seminar, held in Dushanbe, Tajikistan in November 2014, with participation of delegations (national representatives) of five CA states and Afghanistan, a special action plan was designed on glacier monitoring and glacier-induced hazard risk reduction, in which the GLOFs were highlighted.[25] During the last seminar, held in Bishkek, Kyrgyzstan in November 2016, which discussed the progress made on the Dushanbe, and during which the project proposal was reviewed by all CA country participants and international experts in a group work, the following was agreed:

- To support UNESCO's regional project proposal "Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate" for submission to the Adaptation Fund.
- To support the interest of Kazakhstan and Afghanistan to participate in the above project.
- To develop uniform criteria of glacier lake outburst risk, their classification and the assessment of risk and vulnerability of the population living below the mountain valleys.
- To develop a methodology for glacier lake monitoring and EWS in the project countries.
- To facilitate the organization of glacier lake monitoring in the project countries.

[25] http://unrcca.unmissions.org/Portals/unrcca/Articles%20and%20Publications/Glacier_book_ENG.pdf

- Key areas for each participating country were suggested as potential project sites, but more information needs to be obtained *in situ*.
- To analyse and evaluate existing projects/data/situation in the field of GLOFs.
- To recommend undertaking a socio-economic analysis of risks for the population and infrastructure in the potential project sites.
- To promote education/training for local communities in the potential project sites, as well as strengthen the training of specialists in the field of glacier lake monitoring and installation of EWS.

The project proposal has been prepared in accordance with prevailing National Sustainable Development Strategies, Adaptation Plans and DRR strategies. Given the potential participation of all relevant Central Asian countries, a wide range of relevant national development programs and plans of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan were studied to identify the countries' main priorities and needs in the field of CCA, which form the basis of the project concept.

Stakeholder Consultations: Project Concept Stage

Capacity and needs assessments were conducted by UNESCO starting in late 2014, during and following the above UNESCO co-organized seminars held on the topic of Glacier Melting and Climate Change, implemented in close cooperation with relevant government and scientific counterparts in DRR and water from the region.

From September 2015 to July 2017 additional consultations were conducted with preselected potential project partners in countries and international partners/experts in the area in the course of various meetings. Ensuring that the identified area for action would meet the priorities and needs of the Governments and receive support from key national partners was crucial. For this purpose, UNESCO held consultative meetings with number of international actors involved in DRR and CCA active in each country, but notably national institutions that are involved in this subject (Ministries of Emergency Situations, State Agencies on Environment Protection and Forestry, Academy of Sciences, research institutions, NGOs). Separate consultations on specifically on the project proposal were held in Kyrgyzstan (including a discussion of potential pilot communities) in February 2017 and in Tajikistan in April 2017. All these consultations proved successful and received full support by key national partners and relevant government counterparts. In addition to the country AF focal point endorsement letters, an endorsement letter for the project concept was received by the Committee on Emergency Situations, Ministry of Internal Affairs of Kazakhstan in July 2016.

Stakeholder Consultations: Project Formulation Stage

Stakeholder consultations during the project formulation have been broad and robust. UNESCO has held multiple meetings with government stakeholders in participating countries in 2018 and 2019, and it has also met with a variety of CSOs, including regional organizations and national and regional environmental NGOs.

Community consultations in vulnerable communities were also held in each country in March and April 2019. The consultations covered a total of 20 villages in four countries with a combined population of more than 85,000. Nearly 250 people (including local government officials, NGOs representatives, and villagers) participated in 7 community consultations in mountainous areas: 2 consultations covering 2 villages in Kazakhstan; 2 consultations covering 2 villages in Kyrgyzstan; 1 consultation covering 14 villages in Tajikistan; and 2 consultations covering 2 villages in Uzbekistan. More than seven nationalities were represented among the participants. Most of the consultations included

awareness-raising presentations and question-and-answer sessions in addition to the completion of structured questionnaires by participants. Women formed 38% of the participants in the community stakeholder consultations.

In addition, the project consulted a group of 30 university students and young researchers in March 2019 at a DRR-related meeting in Almaty, administering the stakeholder questionnaire and discussing potential participation for emerging researchers under project activities.

It should be noted that the entire consultation and project drafting process was guided by the AF recommended approach as described in the AF documents: Results Framework and Baseline Guidance - Project Level, Environmental and Social Policy of November 1003 and the Instructions for Preparing a Request for Project Funding of November 2013. Thereby special attention has been given to the inclusion of marginalized groups, women, ethnic minorities, indigenous people.

Finally, on July 24, 2019, UNESCO organized a Stakeholder Validation Workshop in Almaty, Kazakhstan. A list of participants is included in Annex 2. Representatives from all participating countries provided current information on government and non-governmental initiatives, and representatives from the pilot communities also attended the workshop. Stakeholders expressed their support for the project, and no serious objections were raised. Participants emphasized the need for outreach and awareness raising at the level of governmental decision-makers, and several participants emphasized the importance of using the science-based assessments in the first two project components to underpin the activities in the other three components. The discussion also resulted in the identification of the CESDRR Centre as a conduit for information, and its annual inter-ministerial forums to act as a mechanism to exchange project findings for policy making.

Stakeholder Involvement

The following table presents a list of project stakeholder, their involvement in the project's design and preparation, and their proposed role in project implementation. Annex 2 provides additional, more detailed information about meetings with stakeholders, including formal consultations, and a summary of their input and feedback.

Table 3: Overview of Stakeholder Involvement in Project Design and Implementation

Stakeholder	Relevance to Project / Involvement in Project Design	Proposed Role in the Project
Country-Level Stakeholders		
Kazakhstan		
Ministry of Ecology, Geology and Natural Resources (Department of Climate Policy and Green Technologies)	Department of Climate Policy and Green Technologies of the Ministry of Ecology, Geology and Natural Resources is an institutional focal point for the UNFCCC in Kazakhstan. The Ministry has been consulted and has contributed to the formulation of the project.	As the designated authority for the AF, the Department will liaise with the project, as necessary, on matters related to the project implementation.
Committee for Emergency Situations, Ministry of	Committee carries out functions in the field of civil protection related to Disaster Management and Emergency Response against natural and man-made emergencies,	Focal Point on Disaster Risk Reduction activities in the Republic of Kazakhstan.

Internal Affairs	the provision of emergency medical and psychological assistance to the population, fire safety and civil defense organization of the Republic of Kazakhstan. The Committee is tasked with formation and implementation of state policy in the field of civil protection, as well as the implementation of intersectoral coordination in this area. The Committee was consulted on the development of the project.	
Kazhydromet	Kazhydromet is a national institution with a monitoring network including water observation points. This government agency is also authorized to issue disaster warnings. Kazhydromet is actively involved in projects related to climate change and contributes to the implementation of reporting under the UNFCCC. Kazhydromet has been consulted during formulation of the project.	The project will support communication, coordination and information sharing with Kazhydromet.
Kazseleza-shchita	Kazselzashchita is a state agency under the Committee for Emergency Situations with its regional departments. The agency focuses on disaster prevention and response for mudslides, avalanches, and landslides. It carries out preventive engineering measures and maintains and repairs public works designed to prevent natural disasters, including a focus on moraine and glacier lakes. The agency has been consulted and has contributed to the formulation of the project.	State agency “Kazselezashchita” will be involved in the development, launch and implementation of the EWS in Kazakhstan.
Institute of Geography of the Academy of Sciences of Kazakhstan	The Institute conducts several lines of research that are directly relevant to the project. The Institute also houses a Department of Glaciology, which conducts year-round monitoring and research at three remote stations in the Northern Tien Shen mountain range. Research focuses on snow-ice and water resources in a changing climate. The Institute has been consulted and has contributed to the formulation of the project	The Institute of Geography will be involved in conducting a scientific assessment of the hazards and risks of the GLOFs.
Civil Society Organizations (CSOs)	CSOs provide important links to local communities and have already played a role in project preparation. For example, the Public Fund “Center “Cooperation for Sustainable Development” (CSD) organized a series of community-based consultations for vulnerable communities at risk of GLOF, living in the Nauryzbai district of Almaty city, as well as in the Esik and Talgar towns of the Almaty region.	CSOs will be involved in conducting community-level activities in the pilot areas, in particular, trainings at the local level of the communities at risk from GLOFs.
Selected local governments	In the framework of the project formulation, consultations were held with local communities living in the Nauryzbai district of Almaty city, as well as in Esik and Talgar	These governments have immediate responsibility for the welfare of the pilot communities. Local

	towns of Almaty region, which are at risk of GLOF. Consultations were held with the participation and assistance of representatives of local authorities in Almaty city, Esik and Talgar towns. Local governments in the potential pilot communities provided their active support for the community consultations, and they provided demographic data that has been used in the project documentation.	authorities will be involved in risk reduction and climate change adaptation planning at the local level.
Participating vulnerable communities	As part of the project preparation, in 2018–2019, consultations were held with local communities living in areas at risk of GLOF: in the Nauryzbai district of Almaty city, as well as in Esik and Talgar towns of Almaty region. Vulnerable communities in Almaty, Esik and Talgar took direct part in consultations through questionnaires, verbal and written interviews and, thus, made a significant contribution to the formulation of the project proposal. Vulnerable communities are in the focus of this project. Community members from potential pilot communities have participated actively in the community consultations described in Annex 2, and a community representative attended the July 2019 Stakeholder Validation Workshop.	Participating communities and vulnerable groups are the main consumers and beneficiaries of project outcomes. They will help to shape concrete measures for vulnerable communities and will provide and receive information related to the hazards and risk reduction.
Kyrgyzstan		
State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic	The state agency is responsible for implementing and ensuring compliance with environmental policies and regulations in Kyrgyzstan. It oversees international environmental cooperation. It houses focal point of the UNFCCC. The Agency was consulted during the formulation of the project.	As the designated authority for the AF, the State Agency will liaise with the project as necessary on matters related to the project implementation.
Ministry of emergency situations of the Kyrgyz Republic	The Ministry is the state body responsible for DRR and emergency response in Kyrgyzstan. In the structure of the Ministry, there is the Department of Monitoring and Forecasting of Emergencies, as well as the Department for Prevention and Response of Consequences of Emergencies, aimed at preventing and responding to disasters. Consultations were held with the Ministry during project formulation	Focal Point on Disaster Risk Reduction activities in Kyrgyz Republic
Kyrgyzhydromet	Kyrgyzhydromet under the Ministry of Emergency Situations of Kyrgyzstan performs such functions as forecasting, modeling and research. Consultations were held with Kyrgyzhydromet during formulation of the project	The project will liaise, coordinate and exchange information with Kyrgyzhydromet.
Central Asian Institute for Applied	CAIAG is a non-profit scientific institution in the Kyrgyz Republic. Climate, water and geo-ecology are among the areas of CAIAG	The institute will be involved in conducting a scientific assessment of

Geosciences (CAIAG)	activity. The Institute has compiled and published a series of maps on hazardous natural processes and phenomena in Kyrgyzstan, which include hazards to GLOFs. Consultations were held with CAIAG during formulation of the project	GLOF hazards and risks and implementation of the EWS.
Institute of Water Problems and Hydro-Power, National Academy of Sciences	The institute is focused on conducting fundamental research and applied research in the field of rational use of water and water-energy potential of the Kyrgyz Republic. The Institute has developed a National Policy Strategy on the use of transboundary water resources, and also conducted research in the field of a modeling various hydrological processes.	The Institute will be involved in conducting a scientific assessment of the GLOF hazards and risks in collaboration with CAIAG.
Kyrgyz National University	The University is a large, well-equipped scientific and educational center of Kyrgyzstan, which is relying in its activities on advanced development and technology. It has a widely branched infrastructure for numerous educational and scientific programs, educational and laboratory facilities, educational and methodological, organizational and educational activities. The university successfully conducts research in the field of basic natural sciences, as well as social and human sciences. Consultations were held with the University during project development.	The University will be involved in the transfer of knowledge gained through the project to students and young professionals in the form of networking, capacity building and new educational modules and programs.
Local governments	In the framework of the project formulation, consultations were held with local communities living in areas at risk of GLOF: in the villages of Tosh-Bulak, Sokuluk District and Yuryevka Issyk-Ata District. Consultations were held with participation and assistance of representatives of local authorities. Local governments in the potential pilot communities provided their active support for the community consultations, and they provided demographic data that has been used in the project documentation.	These governments have immediate responsibility for the welfare of the pilot communities. Local authorities will be involved in risk reduction and climate change adaptation planning at the local level.
Participating vulnerable communities	In the framework of the project formulation, consultations were held with local communities living in areas at risk of GLOF: in the villages of Tosh-Bulak, Sokuluk District, and Yuryevka Issyk-Ata District. Vulnerable communities in the villages of Tosh-Bulak and Yuryevka were directly involved in the consultations and contributed to the formulation of the project proposal.	Participating communities and vulnerable groups are the main consumers and beneficiaries of project outcomes. They will help to shape measures for communities and will provide and receive information related to the hazards and risk reduction.
Tajikistan		

Committee for Environmental Protection under the Government of the Republic of Tajikistan	The Committee coordinates the activities of state bodies in the field of environmental protection, as well as state control over the use of natural resources, protection of land, mineral resources, forests, water and other resources. In the field of climate change, the Committee oversees the activities of the Hydrometeorology Agency. The Committee was consulted during the formulation of the project.	As the designated authority for the AF, the Committee will liaise with the project as necessary on matters related to the project implementation.
Committee of Emergency Situations and Civil Defence under the Government of the Republic of Tajikistan	The Committee is a government agency tasked with disaster risk reduction and response. The Committee reviews and analyzes disaster risk assessments in the context of climate change, and has a department responsible for evacuation and resettlement. The Committee is based in Dushanbe city and has representatives in every region and district of the country. The Committee was consulted during the formulation of the project.	Focal Point on Disaster Risk Reduction activities in the Republic of Tajikistan.
Agency on Hydrometeorology of the Republic of Tajikistan	As a National Focal Point for the UNFCCC, the Agency contributes to addressing climate change issues and coordinates climate change activities in the country. The Agency operates the Center for the Study of Climate Change and the Ozone Layer. The Center processes information and reports on all aspects related to climate research, mitigation of its changes and adaptation to them, which led to the development of a National Action Plan on Adaptation to Climate Change and a National Adaptation Strategy 2012-2030 The Agency was consulted during the formulation of the project.	The project will liaise, coordinate and exchange information with the Agency.
State Scientific Institution "Center for the Glaciers Study under the Academy of Sciences of the Republic of Tajikistan"	The Center conducts research in the field of glaciology in order to study and carry out continuous monitoring of glaciers and other water sources in the Republic of Tajikistan. The Center was consulted during the formulation of the project	The Center for the Study of Glaciers will be involved in conducting a scientific assessment of the hazards and risks of the GLOFs.
Institute of Geology, Earthquake Engineering and Seismology under the Academy of Sciences	The institute is currently the leading organization of the republic in scientific research of geological structure and minerals, seismology and seismic resistant construction. The Institute was consulted during the formulation of the project.	The project will liaise and exchange information with the Institute.
Institute of Water Problems,	The Institute conducts scientific research in the field of water resources, as well as the development of general energy and	The Institute will be involved in ensuring the transfer of knowledge

Hydropower and Ecology of the Academy of Sciences	hydropower industry in Tajikistan. The structure of the Institute consists of several departments and laboratories, including the Laboratory of Climatology and Glaciology. Consultations were held with the Institute during project formulation	gained through the project to students and young professionals in the form of networking, capacity building and new educational modules and programs.
Ministry of Energy and Water Resources	The Ministry carries out activities to regulate the use and protection of water resources, as well as functions in the implementation of the country's water and energy policy. In addition, the Ministry coordinates the activities of various ministries and departments on the management, use and protection of water resources. Consultations were held with the Ministry during project formulation	In the framework of the project, communication and information exchange will be maintained with the Ministry.
Tajik National University	The University is a major educational, scientific and cultural center, which plays a large role in the development of science, education and culture, enhancing national identity and training highly qualified personnel. The University has faculties, research and educational laboratories that provide training in various fields, including the natural sciences, both fundamental and applied. Consultations were held with the University during project formulation	The University will be involved in the transfer of knowledge gained through the project to students and young professionals in the form of networking, capacity building and new educational modules and programs.
Aga Khan Agency for the Habitat (AKAH)	The Aga Khan Agency for the Habitat in Tajikistan is a member of the Aga Khan Development Organization. In order to respond to the growing hazards, posed by natural disasters and climate change, the Agency conducts various activities aimed at enhancing the preparedness and response of people living in high-risk disaster-prone areas. Consultations were held with the Aga Khan Habitat Agency during project formulation, including on the communities involvement	The Agency will be involved in conducting an assessment of hazards and risks from the GLOFs, as well as in conducting community-level activities in pilot areas.
Local governments	In the framework of the project formulation, consultations were held with local communities living in Shugnan region of the Gorno-Badakhshan Autonomous Region, which is at risk of GLOFs. Consultations were held with the participation and assistance of representatives of local authorities. Local governments in the potential pilot communities provided their active support for the community consultations, and they provided demographic data that has been used in the project documentation.	These governments have immediate responsibility for the welfare of the pilot communities. Local authorities will be involved in risk reduction and climate change adaptation planning at the local level.
Participating vulnerable communities	In the framework of the project formulation, consultations were held with local communities living in Shugnan region of the Gorno-Badakhshan Autonomous Region, which is at risk of GLOFs. Vulnerable	Participating communities and vulnerable groups are the main consumers and beneficiaries of project outcomes. They

	communities from eight settlements / villages participated directly in the consultations, and contributed to the formulation of the project proposal	will help to shape measures for communities and will provide and receive information related to the hazards and risk reduction.
Uzbekistan		
Center of Hydrometeorological Service under the Ministry of Emergency Situations of the Republic of Uzbekistan (UzHydromet)	The mandate of this government agency focuses on hydro-meteorological forecasting, and it issues disaster warnings in case of extreme weather events. The tasks of the Center include the development and improvement of the state system of hydrometeorological observations, hydrometeorological support of economic sectors, research, improvement of short-term and long-term weather forecasting, river flow, climate change. UzHydromet also works in research related to climate change and reporting on the UNFCCC. Consultations were held with UzHydromet during project formulation.	As the designated authority for the AF, Uzhydromet will liaise with the project as necessary on matters related to the project implementation. The project will maintain communication, coordination and exchange of information with UzHydromet.
Ministry of Emergency Situations	The Ministry is the central government body that manages and coordinates work in the field of civil protection, prevention and response to emergency situations, caused by accidents and natural disasters. It is responsible for overseeing and coordinating government disaster relief efforts. Consultations were held with the Ministry during project formulation.	Focal Point on Disaster Risk Reduction activities in the Republic of Uzbekistan
Institute of Geology and Geophysics under the State Committee on Geology and Mineral Resources	The Institute is a multidisciplinary scientific institution in which scientists solve topical and applied problems of geology, glacial geology, geoecology, geophysics, and other related areas. The Institute continues to make a significant contribution to the development of the fundamentals of geology and the expansion of the mineral resource base of the country. Consultations were held with the Institute during project formulation.	The Institute will be involved in conducting a scientific assessment of the hazards and risks of GLOFs. In addition, the Institute will be involved in conducting activities at the local community level in the pilot areas.
National University of Uzbekistan named after Mirzo Ulugbek	The National University of Uzbekistan named after Mirzo Ulugbek is one of the leading higher educational institutions of the country. About fifty scientific schools operate in the University. For the implementation of the inextricable connection of theory and practice in the process of teaching at the University, the material and technical base of three sites for field practice, thirty-two research and training laboratories, three educational and experimental centers, one inter-university scientific laboratory and two rare objects is being strengthened. To date, the University has trained over one hundred thousand	The University will be involved in the transfer of knowledge gained through the project to students and young professionals in the form of networking, capacity building and new educational modules and programs.

	specialists in various fields of knowledge, making a significant contribution to the staffing of various sectors of the economy of Uzbekistan. Consultations were held with the University during project formulation.	
Local government in the project site area	As part of the project formulation, consultations were held with local communities living in the Tepar and Pskem villages that are at risk of GLOFs. Consultations were held with the participation and assistance of representatives of local authorities. Local governments in the potential pilot communities provided their active support for the community consultations, and they provided demographic data that has been used in the project documentation.	These governments have immediate responsibility for the welfare of the pilot communities. Local authorities will be involved in risk reduction and climate change adaptation planning at the local level.
Participating vulnerable communities	As part of the project formulation, consultations were held with local communities living in areas at risk of GLOFs - in the villages of Tepar and Pskem. In order to provide a better understanding and assessment of the vulnerability of local communities to the effects of climate change, including the hazards of glacier lakes, a survey of the local population was conducted. Thus, vulnerable communities of the villages of Tepar and Pskem were directly involved in the consultations and contributed to the formulation of the project proposal.	Participating communities and vulnerable groups are the main consumers and beneficiaries of project outcomes. They will help to shape measures for communities and will provide and receive information related to hazards and risk reduction.
Regional and International Stakeholders		
Center for Emergency Situations and Disaster Risk Reduction (CESDRR)	The Center is a permanent interstate body, an international organization, established to ensure effective mechanisms for mitigating risks of emergency situations and mitigating their consequences, as well as stimulating regional and international cooperation. The tasks of the Center also include mitigating disaster risk factors, identifying, assessing and monitoring disaster risks and predicting them. The Center was consulted during the formulation of the project. UNESCO supported the CESDRR in establishing the Regional Science and Technology Council for Emergency Situations and Disaster Risk Reduction in Central Asia, which is designed to bridge the gap between science and policy in the field of the DRR.	CESDRR will be engaged as a platform for distribution of knowledge and lessons-learnt about the risks, from targeted demonstration projects. Its annual inter-ministerial forums on DRR will be used as a regional mechanism to exchange project findings for supporting policy making
University of Central Asia (UCA)	The University, which has a branch in Dushanbe and Khorog cities, has a research unit of mountain communities that conducts interdisciplinary research to support the development of mountain regions in Central Asia. The University also created a knowledge center for data and information	The project will maintain communication with the University and exchange information.

	related to the Central Asian mountain communities.	
University of Zurich (Switzerland)	The University has a wide profile and long-term experience in glacier lakes research, including aspects of their formation, assessment and monitoring, as well as in the field of GLOF modeling and assessment of associated hazards, vulnerabilities and risks. The formulation process of the project proposal was coordinated with the University specialists, who were consulted repeatedly.	The University will be responsible for the implementation project components related to the EWS and associated with it.
UN agencies involved in the DRR and CCA areas	The UN office for Disaster Risk Reduction (UNDRR) has worked with the European Civil Protection and Humanitarian Aid Operations to support the development of a Plan of Action for implementing the Sendai Framework in Central Asia.[26] UN country planning frameworks provide an opportunity to coordinate DRR and CCA activities across a range of hazards. UN agencies also implement a variety of CCA and DRR projects at the country and regional level. From CCA/DRR perspective, the GLOF project is at the intersection of climate change and disaster risk reduction issues and viewed through the prism of rising temperature in the mountains – glaciers melting process - formation of the new glacial lakes, with a potential breakthrough (GLOFs) – hazard to downstream living communities. Other UN agencies whose activities are specifically related to the project are the UNRCCA, UNICEF, UN Development Program, UN-Environment and UN-Women.	UNESCO's efforts in regional cooperation towards application of science in Central Asia is coherent to the UNISDR Plan of Action on Implementation of the Sendai Framework for Central Asian and South Caucasus region (Chapter IV, article 6) UNESCO's efforts conforms the UNISDR "The Sendai Seven Campaign" in terms of installation of the GLOFs EWS and the year of 2022, dedicated to the Target (g): Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030. The activities and expertise of the UNRCCA, UNICEF, UN Development Program, UN-Environment and UN-Women to some extent relate to individual components of the project and can be used in its implementation.
International Financial Institutions (IFIs)	The World Bank is currently implementing two projects that have potential synergies, one on hydromet strengthening and one on climate	Coordination of activities and synergies with IFI projects.

[26] UNISDR, ECHO (2016): Plan of Action: Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 in Central Asia and South Caucasus Region.

	change knowledge and capacity strengthening (see Section G). Relevant areas include EWS in Kyrgyzstan (under the WB project: “Central Asia Hydrometeorological Service Modernization Project (CAHMP).” This activity includes the following: Creating an automatic monitoring system for previously identified and assessing high mountain lakes with high risk of GLOF. Installation of a system for automatic monitoring of water levels in lakes and other meteorological parameters, which provides data on the on the state of risky lakes in the real time, helping to population in the lower territories. Real-time monitoring data will be available to both Kyrgyzhydromet and the Ministry of Emergency Situations, which, in turn, is responsible for preparedness and forecasting of the potential floods. This will be associated with preventive evacuation measures in case of an increased risk of flooding. Under component B.2.5, the following activities are envisaged: Establishment of a mobile response team for monitoring lakes, glaciers and dangerous places with increased risk. Purchase of laptops, mountaineering equipment, photo and video cameras, binoculars, GPS navigators, portable weather stations, steam drills for ice, communications equipment (radio stations, satellite phones), theodolites, tents, sleeping bags, camp utensils, special clothing and other devices life support. Staff training will also be conducted. Such a unit will allow quickly assess dangerous situations and assist in taking immediate preventive measures to reduce the hazards	
Bilateral development agencies	Bilateral development agencies, such as the German Society for International Cooperation (GIZ, Germany) and the Swiss Agency for Development and Cooperation (SDC).	The project will maintain constant communication with bilateral development agencies through direct communication and participation in donor forums. In addition, interaction will be established with ongoing GIZ and SDC projects and initiatives implemented in the region.
Research institutes and universities outside of the	Moscow State University, University of Reading, University of Fribourg and others who have relevant data and experience in the	Enhancement and fostering of regional collaboration through cost-effective joint

Central Asia	project's objectives, taking into account their previous and current research initiatives.	training and education programmes (see Output 1.3).
International Centre for Integrated Mountain Development (ICIMOD)	ICIMOD conducts research in Himalayan mountainous areas that is directly relevant to the project on topics ranging from climate change adaptation in mountain areas to the differentiated impacts of climate change on women and men. ICIMOD also has extensive experience in modelling glacier change and measuring glacier mass and loss.	The project will share information and best practices with ICIMOD on an ongoing basis
Private Sector Companies	The private sector manufactures equipment that is necessary for the pilot EWS systems.	The project will procure the hardware and communications equipment necessary for the pilot EWS system from private sector company/ies.

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

Component 1: Strengthening national and regional capacity to monitor and assess GLOF hazards

Baseline (without AF resources):

The Soviet Union had a long tradition in glaciology and a strong hydro-meteorological monitoring system with well-trained specialists. After the fall of the Soviet Union this system collapsed and the CA states found themselves left alone with the consequence that most research and monitoring of glaciers ceased for decades. With financial and technical support of IFIs and bi-lateral aid agencies the situation changed slowly with the result that knowledge about climate change and the effects of glacier melting in the CA mountains became available: “The situation is alarming - glaciers melt at a very fast rate”. Today no comprehensive or homogenous first order mapping and monitoring program on the regional level has been implemented, and databases on glacier lakes remain unequally developed and maintained.
The lack of a regional approach to monitoring glacial lake development means that the threats are not addressed equally and there is no common basis for the design of response and adaptation strategies. Without a common regional approach, lakes which may provoke far-reaching or transboundary floods have not been systematically addressed. Monitoring systems are installed sporadically. The level of expertise within local responsible authorities remains unequal both between countries as well as between areas with different population levels. The involvement and capacity of the young scientists, especially women, remains extremely low.

Adaptation alternative (with AF funding):

In conjunction with greater regional cooperation in the framework of this project, the strengthening of relevant institutions will take place for developing strategies towards hazards of a trans-boundary nature, such as GLOFs. Responsible authorities extend their capabilities beyond simply monitoring known threats, to the anticipation of where new potentially hazardous lakes will emerge as glaciers continue to retreat, allowing adaptation

planning to be forward looking, and avoiding possible maladaptation. Rapidly emerging threats are identified and a common approach to monitoring and reporting lake developments is implemented across the region, with particular emphasis given to transboundary catchments. The causes and processes leading to hazardous lake formation are understood and communicated to a wide-range of stakeholders. Engaging communities within the knowledge generation process enhances their understanding of the changing natural environment in which they live, and raises their awareness of the threats that are faced. In this manner, knowledge and awareness become the foundation for building resilience and reducing societal vulnerabilities. Regional workshops and joint training will enable knowledge to be exchanged and methodologies fine-tuned based on local experiences.

Capacity building of the next generation of young scientists ensures the long-term sustainability of the monitoring programmes across the region.

Component 2: Strengthening sub-national, national, and regional policies and approaches to address the needs of vulnerable communities

Baseline (without AF resources):

No comprehensive or homogeneous first order GLOF risk assessment has been completed for Central Asia, meaning that some significant threats could remain undetected. Without a common assessment framework, the regional distribution of GLOF risk remains unclear and transboundary threats have not been systematically assessed. This may have prevented capacity building programs and other adaptation initiatives from reaching the most endangered or marginal communities and sectors, where potential losses from GLOFs could be greatest. Consideration has not been given to the possible changes in frequency and magnitude of future GLOF events, or change in exposure of communities and infrastructure, that will result from the growth and formation of new lakes over coming decades.

Adaptation alternative (with AF funding):

A first homogeneous assessment of GLOF risk across the participating countries, providing the scientific basis for informed and collaborative adaptation planning. Risk hot spots are identified under both current and future climatic conditions, allowing adaptation resources to be targeted to those locations where society or sectors can benefit most. Within these hot spots, local hazard maps created for both current and future conditions, and exposed communities engaged with local authorities to develop a set of possible adaptation solutions, which are firmly embedded and supported within the local context. Transboundary risks identified and communicated across partner countries.

Component 3: Design and launch of EWS and risk reduction measures tailored to local contexts

Baseline (without AF resources):

The country preparedness and capacity of risk mitigation remains uneven including country capacity to react in case of the transboundary threats. Information for local communities is dispersed unevenly, and threats to remote and indigenous communities remain higher in all countries. Usually in CA the ministries have disaster management departments at national as well as province level and, in some cases, district level. However, a common problem is the general lack of equipment and finance available to these entities. Furthermore, despite the large amount of information that is available to

them, resources and working practices are outdated. Another issue involves forecasting departments which although they are included within the ministries and have a good technical understanding of disaster prevention and preparedness, they lack a practical approach and coordination. As indicated by Tajik authorities, there is a lack of EWS on geohazards and water-related hazards. Moreover, those that exist are not properly translated into the local context, and local populations (local communities are not educated) especially the most vulnerable, remain at a highest risk from these hazards.

Adaptation alternative (with AF funding):

Institutional mechanisms and framework conditions for effective DRR are established in all four countries, enabling transboundary hazards to be addressed as well. For the selected sites (one in each country) an adequate EWS solution is designed and implementation plans are elaborated, based on the findings of component 2 and taking into account the local knowledge as well as the needs of the potentially affected population. On the local and regional level, roles and responsibilities related to the designed EWS are clarified between involved authorities to ensure better coordination. The established institutional mechanisms not only allow for the successful implementation of the designed GLOF EWS, but also provide the required framework conditions for effective DRR in general. Local populations, especially the most vulnerable are engaged, informed, educated, and develop GLOFs resilience.

Component 4: Targeted demonstration projects to introduce technologies and best practices for EWS for glacier lakes

Baseline (without AF resources):

The capacity of local research and public institutions, as well as companies will continue to evolve only slowly and sporadically.

There is currently a lack of complex, comprehensive and coordinated EWS in Central Asia. Lake monitoring, for example, uses helicopters in Kazakhstan and Tajikistan. However, no complex and coordinated system exists up to date in each of the countries. Besides the EWS response protocols remains outdated and uncoordinated between the countries.

Adaptation alternative (with AF funding):

At one site a state-of-the-art EWS for GLOFs has been implemented in collaboration with the local private sector. The EWS is operated by the responsible authorities, which were capacitated and trained for the operational service and maintenance. Financing for long-term maintenance is assured. Authorities and local population are well-trained to respond immediately and appropriately if a warning is activated. This demonstration EWS serves as an example for information and capacity building of authorities from the other two countries, and lessons learnt from this implementation can be transferred and scaled up to other potential EWS implementation sites in CA and beyond.

Component 5: Knowledge exchange, stakeholder engagement, and communication

Baseline (without AF resources): Despite numerous international/regional meetings and conferences, institutionalised knowledge exchange between countries/stakeholders remains very low, especially between responsible government bodies. Modern communication media (e.g., web-based knowledge exchange platforms) have not been developed in the context of CCA and disaster risk management. Emergency preparedness

remains uneven between communities, especially for those communities for which the level of threat is currently deemed low, but which might change in the future.

Adaptation alternative (with AF funding):

Risks associated with the rapidly changing cryosphere are elevated to be both a focus and stimuli for regional cooperation and exchange in the area of CCA across Central Asia. All key stakeholders have access to the knowledge and information needed for robust adaptation planning. Technical capacities and financial strategies are in place to ensure the long-term maintenance and sustainability of monitoring and adaptation strategies, and to ensure knowledge exchange mechanisms (e.g., the web-platform) remain active and accessible to all stakeholders. Permanent mechanisms are in place to ensure that local knowledge continues to feed into the decision-making process, and vice-versa, enhanced communication is maintained between the authorities and communities. Lessons learned and best practices established from the implemented project serve as a template for regional-scale CCA projects across high mountains in Asia, and more globally.

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

The project idea and design is the result of a long process, which started during consultations with CA governments and discussions during conferences and national and local consultations over the last three years. From the very beginning sustainability was the guiding principle when defining objectives, expected outcomes, outputs and activities of this project.

The project builds on existing institutions and will work out accepted mechanisms for efficient DRR action. Involvement of and close collaboration with Governments and responsible regional and national and local authorities at all stages of the project are crucial as well as collaboration with and involvement of the local population from the beginning of the design throughout the entire implementation. The involvement of school children in local educational programmes, as well as strengthening knowledge of students - future researchers in Central Asia - also contributes towards sustainability in addressing GLOF risks.

The following strategies and lines of action are planned to secure sustainability of the EWS:
Sustainability must be ensured along three main components of the EWS: technical, institutional, and social components. Full sustainability can only be achieved when all three components are sustainable on their own but also in relation to the other two:

1. Sustainability on a technical level requires appropriate technical instruments for the local conditions, both in terms of physical high-mountain environment and local technical capacities available at the sites and in the region. The technical components of the EWS need to be adapted to local capacities, including to a level that capacities can be built and strengthened within the project.
2. Sustainability on an institutional level is particularly important and the frequent source of failure as past experience demonstrates. Technical capacities of the responsible institutions are again an important element but not sufficient. Clear responsibilities need to be defined during the process of the design and implementation of the EWS. Key is the long-term maintenance of the EWS and for this purpose financial and personnel resources need to be planned and secured in the budgets of the local or national institutions. Budget restrictions need to be taken into account from the beginning of the project. Ownership of

the EWS equipment will be transferred to the respective national hydrometeorological agencies at the conclusion of the project. Coupled with institutional training and capacity building, this approach has proved successful in several other related projects.

3. Sustainability on the social level can only be achieved when the EWS has high acceptance within the local population. Their involvement from the beginning is critical to achieve this objective. The social conditions need to be carefully analysed from the beginning and strategies be defined to achieve long-term acceptance and support by the local affected population. Ownership is the ultimate objective.

4. The following aspects, derived from different project components, will also contribute to the sustainability of the project:

- Capacity development at multiple levels will ensure that the countries are well equipped and motivated to maintain long-term, sustainable adaptation strategies implemented under this project.
- Education, capacity building and twinning programmes developed and implemented in local universities, will ensure that young local scientists are equipped with fundamental knowledge regarding the cryosphere, glacier lakes, and related hazards.
- Identifying a company/institute, if possible locally, to take over the technical engineering, including the acquisition of suitable equipment, the construction of the EWS stations, and the electronic and software engineering for the data transfer, processing and storages, is also foreseen.
- A maintenance and financing strategy will be developed during the project for ensuring long-term sustainability of the EWS in the countries.

In regard to the long-term maintenance and sustainability of complimentary adaptation measures, focus is given to awareness raising, and training and capacity building at the community level (under Outcome 5). This is particularly relevant for the management of drainage channels and further engineering measures, ensuring that communities are aware of the importance of keeping waterways and defense structures clear of rubbish and other debris, and ensuring that engineered structures are respected and protected from vandalism.

Project experiences from Pakistan, Bolivia, and elsewhere in the world show that early engagement and strong awareness raising campaigns are crucial to ensure that community groups take pride and ownership in the maintenance of waterways for flood mitigation. Such community-based training and awareness raising was a cornerstone of the successful recent Pakistan GLOF project under AF (with UNDP), where more than 1,000 people, including 50 percent women, in vulnerable communities were sensitized and made aware of GLOF-related hazards, preparedness and adaptation options. The project will build on these and other positive experiences with community engagement to ensure sustainability of the proposed adaptation measures in Central Asia. For example, tree planting to enhance stability and reduce erosion from channel banks will be undertaken with school groups or other community organizations, and this approach represents a very long-term, sustainable, low-cost adaptation measure.

To ensure the highest likelihood of long-term financial sustainability, activities under Output 4.4 will include a comprehensive mapping of national and external funding agencies (bilateral or multilateral, NGO’s, etc.) who could be in a position to support longer-term maintenance of the EWS and other adaptation measures. This approach will be further supported with the development of detailed financial plans. Experiences from EWS implementation in Latin America show that the authorities eventually responsible for the operation and maintenance of the system need to be involved from the very beginning of the process. It needs to be clear from the beginning, that they will get a site-tailored, modern EWS that is complemented by other measures, but at the same time, they will need to develop ownership of these systems and commit to take over operational and financial responsibility once the system will be handed over to them.

A successful strategy for achieving sustainable, long-term financing of EWS and other risk reduction measures involves first raising awareness regarding the associated costs by including them in the annual budget. Then, sources or donors for these costs need to be identified. Development of ownership for the measures by the authorities is crucial for this. The project does not aim to cover these costs directly, as this would increase the risk of a lack of financial resources for maintaining the systems once the direct financial support by the project ends.

The urgency of the matter is also underlined by an increasing number of natural hazards, which for example took place in the Panj River basin along the Tajik-Afghan border in 2017. Entire villages were buried by mudflows, the river changed its course, and the Pamir highway was blocked for 10 days. The dangers are real and the governments in the region recognize that non-action is more expensive than action and they ask the international community to make knowledge, information and experience available. Because of more and more reoccurring water-related hazards the governments are increasingly concerned and therefore projects to monitoring of glacier lakes, thus adapt to climate change, will become a high priority and subsequently will lead to sustainability.

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

Environmental and social impacts and risks relevant to the project were identified through stakeholder consultations, community consultations with potential beneficiaries, and the use of a screening checklist (provided in Annex 5). Risks are summarized below.

Checklist of environmental and social principles	**Risk Mitigation Measures Required**	**Potential impacts and risks – further assessment and management required for compliance**
Compliance with the Law		X[27]
Access and Equity	X	
Marginalized and Vulnerable Groups	X	
Human Rights	X	
Gender Equity and Women's Empowerment		X[28]

[27] EWS and complementary adaptation measures will be subject to country-specific legislation.
[28] While the screening processes did not identify any ways in which the project design or activities would potentially reproduce discriminations against women, there was a consensus among experts consulted that the project should take pro-active steps to encourage women's participation in all project activities; hence, this element will be managed for compliance.

Core Labour Rights	X	
Indigenous Peoples	X	
Involuntary Resettlement	X	
Protection of Natural Habitats	X	
Conservation of Biological Diversity	X	
Climate Change	X	
Pollution Prevention and Resource Efficiency	X	
Public Health	X	
Physical and Cultural Heritage	x	
Lands and Soil Conservation	X	

The project is classified as “B” in accordance with the Adaptation Fund guidance on impact classification due to the presence unidentified sub-projects (USPs) in Outputs 2.1 and 2.2 (design) and Outputs 4.1 and 4.2 (implementation) of the project.

Project activities with potential (limited) adverse impact are small-scale, community-based, and localized. They will be co-managed with local communities where possible. Communities will have a stake in avoiding negative environmental and social impacts. Cascading and/or cumulative negative impacts are highly unlikely. Proposed project activities requiring additional environmental screening, assessment, and/or permitting represent a minor part of the project, and no-impact measures and measures with co-benefits for the environment (e.g. slope tree planting for slope stabilization) will be prioritized.

Monitoring for unexpected environmental or social impacts is included under project M&E activities (see Section III.C) and will be reported on annually.

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.*

This project will be implemented by the UNESCO Cluster Office in Almaty in collaboration with the Governments of Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan and in partnership with the University of Zurich, Switzerland, as well as the participation of local, national and regional institutions and authorities.

A unique strength of this project will be the integration of international expertise and experience from the Swiss partners, with regional and local experts in Central Asia under the auspices of UNESCO, thus highlighting the North-South cooperation. To optimise the exchange of knowledge and capacity building between partners, all project activities will be implemented with teams consisting of experts at various levels.

As the UN specialized agency in the sciences, UNESCO aims at developing a deeper scientific comprehension of the occurrence and distribution of natural hazards in time and space. In fact, UNESCO is mandated to facilitate and promote the use of science and technology to contribute to disaster risk reduction (DRR) and conflict resolution. Reinforcing scientific cooperation is a key element for improving capacity for disaster reduction. By operating at the interface between natural and social sciences, education, culture and communication, UNESCO plays a vital role in constructing a global culture of resilient communities. The Organization is closely involved in the conceptual shift in thinking away from post-disaster reaction to pre-disaster action. UNESCO has many scientific programmes in place that deal with the study of natural hazards and the mitigation of their effects. UNESCO is committed to the Sendai Framework and operates in accordance with its four Priorities for Action.

UNESCO also works to build the scientific knowledge base to help countries manage their water resources in a sustainable way through the UNESCO International Hydrological Programme (IHP). In close cooperation with scientists worldwide, the IHP plays a vital role to establish a scientific and technological base for the sustainable management of water resources threatened by global climate change. The IHP strategy (Phase VIII, 2014-2020), “Water Security: Responses to Local, Regional and Global Challenges” among other themes is focusing on water-related disasters. UNESCO is coordinating projects and activities at global level on scientific collaboration including monitoring glaciers, snow and permafrost conditions and evaluating the implications of climate change on water resources and will provide feedback to develop appropriate adaptive strategies that countries need. In particular, UNESCO is engaged in supporting capacity building activities in glacier monitoring. It has been co-organizing and co-sponsoring trainings for young specialists from the CA (both in Tien Shan and Pamir mountains) and Andean region in the methods of glaciological monitoring for determining the parameters of glaciers mass balance. Two summer schools on “Glacier Mass Balance Measurements and Analysis for young researchers from Kyrgyzstan, Tajikistan and Russia” and “Permafrost and Potentially Dangerous Glacier Lakes”, were held in July - August 2016 in Kyrgyzstan, supported by UNESCO.

The University of Zurich, which will execute designated activities and support in-country organizations in others. University of Zurich, due to its extensive and interdisciplinary research and teaching in the field of climate change, has been selected by the United Nations Academic Impact (UNAI) as the global hub for SDG 13 ‘climate action’ (https://academicimpact.un.org/content/sdg-hubs). The group of the University of Zurich has longstanding experience and a scientific track record in glacier lake science, including aspects of past and future lake formation, lake and slope instability assessment and monitoring, both on the ground and by remote sensing methods, GLOF modelling, as well as assessment of hazards, vulnerabilities and risks. Recently, the University of Zurich has been instrumental in designing and implementing GLOF early warning systems in the Andes of Peru, in close collaboration with national and local partners from the public and private sectors and governmental authorities. Further recent expertise is also available from collaborations on GLOFs in Pakistan, India or Tajikistan, including capacity building of local experts, both governmental and non-governmental. Recognising this long-standing expertise, University of Zurich led in 2017 an international working group in the

development of guidelines for glacier hazard and risk assessment[29] Currently the University of Zurich team is consulting the Government of India for the development of guidelines for the management of glacier related risks in the Indian Himalayan region.

UZH experts have ongoing activities in Central Asia and long-standing relationships with regional experts. Under Component 1 (Strengthening national and regional capacity to monitor and assess GLOF hazards), UZH will undertake applied analysis and capacity building to support mapping and identification of hot spots. Under Component 2 (Strengthening sub-national, national, and regional policies and approaches to meet needs of vulnerable communities), UZH will provide advisory services to support the vulnerability assessment and selection of adaptation options. Under Component 3 (Design and launch of EWS and risk reduction measures tailored to local contexts), UZH will work with a local partner (to be selected) to develop comprehensive site-specific assessments and the detailed design of 4 EWS—one in each country—and complementary measures in a total of 7 communities. They will also oversee the work of the local partner in evaluating sensors and equipment; elaborating the energy supply system; and designing communication and data storage systems and infrastructure. Under Component 4 (Targeted demonstration projects to introduce EWS technology and low-cost adaptation measures in vulnerable communities), UZH will conduct a scientific-technical assessment of the pilots and will provide advice on coordination with the local partner and authorities in the participating communities. Finally, UZH will provide technical and scientific capacity building to experts in the participating countries and will disseminate key findings from the project through activities in Component 5 (Knowledge exchange, stakeholder engagement, and communication)
The project technical and scientific activities will be conducted under the guidance of the UNESCO staff in UNESCO Almaty Office in consultation with UNESCO Headquarters in Paris and in cooperation with the UNESCO National Office in Tashkent (for Uzbekistan). UNESCO will have responsibility to secure the establishment and supervision of the Project Management Unit (PMU) that will be located in the UNESCO Almaty Office.

Financial management of the funding will be the responsibility of UNESCO. It will manage the funds in accordance with its financial rules and regulations, monitor expenditures, and maintain fiscal oversight of all expenditures.

The management structure will be as follows:

Project Steering Committee (PSC). The PSC will be established, which will provide strategic guidance for the implementation of the project. The PSC will be chaired by UNESCO and will include one senior government official from each country, UNESCO representatives, a representative of the main international implementing partners. The PSC will oversee project execution and will act as the main policy guidance body for the project.

The Project Management Unit (PMU) which will be based in UNESCO Almaty Office, will have the following tasks:

- co-ordinating institutional arrangements for management of the activities in the participating countries, the information sharing committee and the steering committee;
- co-ordinating policy and legislative development regarding GLOF;
- development of the KM and communication strategy;

[29] GAPHAZ 2017: *Assessment of Glacier and Permafrost Hazards in Mountain Regions – Technical Guidance Document*. Prepared by Allen, S., Frey, H., Huggel, C. et al. Standing Group on Glacier and Permafrost Hazards in Mountains (GAPHAZ) of the International Association of Cryospheric Sciences (IACS) and the International Permafrost Association (IPA). Zurich, Switzerland / Lima, Peru, 72 pp.

- conducting and overseeing awareness and education activities;
- ensuring that possible partner agency programmes are fully integrated into the project framework;
- monitoring the results of the demonstration projects and supporting their integration into wider development programmes;
- monitoring technical assistance provided by the contracting agencies, including all institutional strengthening services provided to local communities and government bodies;
- conducting and monitoring all training activities;
- ensuring linkages to regional GLOF activities;
- reviewing annual work plans;
- developing the KM system.

An **Information and Experience Sharing Committee (IESC)** will be established as part of the project and will represent a hub for international cooperation within the project's context and beyond. It will have an inter-ministerial nature, formed by high level representatives of the various governmental agencies/ministries of the four countries involved in CCA and DRR. The IESC will be organized according to the following guidelines:

- The IESC will be convened on an as-needed basis (at least once annually) to exchange information on project approaches and findings in the four participating countries and from other projects in other regions as relevant.
- As both governments and CSOs will participate, the IESC will also be used to identify any situations in future projects where there may be potential overlap or duplication so that these situations can be resolved at a very early stage.
- The IESC will be kept informed on activities and outputs in all components of the projects with a view to their completeness and viability in current operating conditions.
- The IESC members will be nominated by the Project Board and the Project Manager.
- The UNESCO Almaty cluster office will function as the Secretariat of the IESC.
- Participation in the IESC will not be renumerated by the project and is considered an in-kind contribution by government agencies and other organizations.
- Participation in the IESC does not carry any expectation of employment with the project or with UNESCO.

National Execution Teams (NET) will be established in each of the four project countries. The NET will be headed by a country coordinator and one to four national experts. Country coordinators will assist the Project Manager in coordinating project activities, they will also assist in securing regular engagement and coordination with the regional and local organizations, institutions and authorities involved in project implementation. They will be chosen among candidates nominated by the countries on the basis of agreed criteria.

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

Mitigation measures against unexpected circumstances will be considered in the full project design, which will be defined through an inception phase undertaken with all involved stakeholders. Potential risks are summarized in the following table.

Table 4: Project Risks and Proposed Risk Mitigation Strategies

Risks:	Level	Mitigation measures/strategy

Financial and Economic		
• The overall economic situation is deteriorating, and migrant workers are returning to Central Asia and governments in the region do not consider DRR a high priority any more. • Governments reduce their funding for DRR	Low	The project will ensure that the necessity for DRR is continuously emphasized through public awareness campaigns, meetings with specialists and decision makers. Parliamentary committees will be kept educated through translation of project results into policy briefs.
Technical		
• The proposed technical solutions might prove to be too ambitious. • The web-based management/content management system might face acceptance problems. • There is a lack of internet access in rural areas.	Low-Med	Early involvement of stakeholders in project planning will ensure that solutions will meet their expectations and requirements. The main EWS strategy will be planned in a way that a low-tech solution will be available, too. Instead of only internet-based solutions, a 3G / 4G solution will be considered. The project will lobby for affordable internet access in mountainous areas.
Social and Political		
• The political and security situation in pilot districts may affect project implementation or weaken the interest of stakeholders to address adaptation planning issues. • Lack of incentives for local communities to cooperate in activities that do not yield immediate results, but aim at longer-term resilience, may reduce stakeholder engagement and strong participation. • Implementing partners for local level initiatives and pilot sites for project implementation may shift during project implementation, due to unforeseen (e.g. political, lack of interest) reasons. • Hazard and risk mapping can lead to marginalised and vulnerable	Low	Project implementation is based on a combination of field-based investigations and remotely based monitoring. Can be tailored in the event of political or security instability. The project will emphasize DRR strategies that bring both immediate and longer- term benefits; e.g., “no-regrets” adaptation strategies. Early and ongoing engagement with communities will be critical, so that they are aware of the benefits to their lives and livelihoods. The project will engage and communicate with a wide-range of local experts and implementing partners, so that there is no dependency on a single agency. The comprehensive training

communities being potentially victimised, when their land-holdings or habitations are identified as being located within high risk zones.		undertaken with local authorities and decision-makers will highlight the full range of adaptation options available. EWS is a measure that protects exposed people and resources and enables inhabitants to live safely in high risk zones. This avoids their victimisation.
Institutional/Management/Governance		
• Delays in recruitment of qualified project staff may affect the timeframe of project activities. • Government and non-governmental agencies do not contribute adequately to the project at different levels. • Changing staff is slowing down project implementation.	Low-Med	Providing good perspective to collaborators in order to keep them in the project. Top government officials consider the project as a high priority Ensure local governments take ownership of the project through early engagement. Participation of local government officers to partner countries (e.g. Switzerland) where they may learn from common experiences with CCA. Capacity building at university level, to ensure next generation of young scientists is well qualified for future government positions.
Environmental		
• Adverse climatic conditions may damage adaptation measures being implemented. • Technical construction of the EWS requires access and some potential disturbance to the natural landscape, at least during the installation phase. • Identified high risk flood zones may be considered of low importance for environmental protection, and therefore neglected.	Low-Med	Project implementation will use latest best-practices and equipment used and proven in harsh environmental conditions. The technical equipment does not require heavy lifting or transportation, minimising disturbances to the natural environment during the installation phases. EWS represent an environmentally friendly adaptation measure, with no permanent alteration of the natural landscape (compared to engineering measures for example). Training of communities and local authorities will highlight the importance of maintaining and even

		enhancing the natural environment in high risk flood zones. For example, vegetation stabilises river banks and reduces erosion.

Over the course of the project, a risk log will be regularly updated at intervals of no less than every six months in which critical risks to the project have been identified and addressed.

Consistent involvement of a diverse set of partners, including local government agencies/departments, NGOs and communities will further reduce these risks.

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

The project's categorization and compliance with the ESP has been outlined in Part II, Section L. In line with AF guidelines, the project has followed a stepwise approach (depicted in the Figure below) towards addressing those risks identified that require mitigation.

Table 5: Management and Monitoring of Residual Risks Related to the Overall Project Design

Principle	Residual Risk	Mitigation Measure	Respon-sibility	Monitoring Indicator	Budget
Compliance with the Law	Adaptation measures implemented under the project may require permits and as such present a risk of non-compliance with local legislation if not properly monitored.	The USPs that are identified in project Outputs 2.1 and 2.2 will be screened at the community level and will bear in mind all necessary procedures such as EIAs, permits, and codes where applicable. Activities with a medium or high risk will not be considered for inclusion in the project. Screening and monitoring will continue as the EWS and complementary adaptation measures are implemented under Outputs 4.1 and 4.2.	UNESCO Staff, Implement ing Partners	At least 4 pilot communities will have undertaken complement ary adaptation options (such as work on channels and/or slope stabilization) in conformity with applicable regulations.	No additional budget
Gender Equity and Women's Empowerment	Women's status and representation may limit their meaningful participation in project activities	Men and women will participate fully and equitably. Women will be consulted in on-site, in-depth community assessments at the project preparation stage. An Initial Gender Assessment and Gender Action Plan have been developed to	UNESCO Staff, Implemen-ting Partners, NETs	Indicators are provided under the Gender Action Plan in Annex 2	No additional budget

		ensure that women are meaningfully engaged in project activities and realize an equitable share of project benefits (see Annex 2). Specific project indicators will ensure that results-based management will cover meaningful participation of both women and men.			

Overview of the Approach to Environmental and Social Management

As the applicant, UNESCO has applied four key mechanisms to comply with the AF ESP:

1. Program-Level Quality Assurance: As elaborated in Part II, Section L. UNESCO's as accredited applicant and IE with oversight responsibilities and core policy to lead in application of environmental, gender and social principles.
2. Project-Level Quality Assurance: As elaborated in Part II, Section L. Screening, by IE, EE and partners in the four countries, of proposed project scope and activities for potential harmful impacts and risks.
3. Screening of impacts and possible risks of proposed project in relation to the 15 core principles of ESP: Categorization of the project as "B."
4. Development and application of ESMP: As per guidelines of the Adaptation Fund. The ESMP is further elaborated below.

Finally, in accordance with the project Monitoring and Evaluation approach, progress reporting will pay specific attention to the compliance issues. The high level of existing stakeholder involvement also ensures a low risk of non-compliance. Whenever potential non-compliance issues arise, the Grievance mechanism can be activated.

The following table represents the approach to environment and social risk management that UNESCO will undertake as the IE.

Table 6: Overview of the Environmental and Social Management Plan for the proposed project

Steps Taken	Responsible Party	Timeframe
Project team awareness and training on compliance with ESP and gender guidelines, monitoring process and related issues Description: UNESCO, as the Implementing Entity, will provide an introduction and training to all project partners, staff, and experts at project inception in order to ensure that all principal project partners have the required knowledge and awareness level regarding their responsibilities with regards to the provision of the Environmental and Social Policy of the AF as well as the promotion of human rights, including specifically the grievance handling mechanism of the AF. The ESP of the AF will be used as the primary guidance to ensure compliance.	Core project team and partners, National Execution Teams (NETs)	During the Project Inception phase

The introduction and training on the relevant concept and tools for compliance will be used for the for all of the participants.		
Awareness and training for key project stakeholders, in particular: a) government partners, and b) pilot communities and associated project staff and consultants, with particular reference to vulnerable groups and indigenous peoples. Description: In order to prevent the exacerbation of existing inequalities, the project will identify vulnerabilities in pilot communities during the project inception phase and will monitor the impact of the project during the entire implementation period. As part of participatory processes, community dialogues, training and close collaboration with national and local authorities will enable participation of vulnerable and marginalized groups and successful identification, management and mitigation of risks.	Core project team and partners, NETs	During the first year of project implementation, repeating as necessary.
Re-assessment of impacts and risks on two levels: 1) The project as a whole; and 2) The USPs in each of the pilot sites Description: For each pilot community, the comprehensive risk screening and mitigation plan will be re-visited, following further detailing of the work plans (i.e. project locations, target groups, specific activities related to effective community response to early warnings, and project interventions to be defined in greater detail during the EWS planning phase). For each pilot community, the comprehensive risk screening and mitigation plan will be re-visited, following further detailing of the work plans (i.e. project locations, target groups, specific activities related to effective community response to early warnings, and project interventions to be defined in greater detail during the EWS planning phase).	UNESCO and the Project Management Unit (PMU) and teams working in pilot communities	During the Project inception phase and upon the start of activities in the pilot communities
Updated reporting on compliance with ESP and gender guidelines and update of the monitoring system Description: As part of the compliance approach, ESMP and progress monitoring, the status and issues arisen will be reported at the end of the Inception Phase. The Inception Phase will re-visit and improve on any inadequacies in the proposed environment and social risk monitoring or mitigation.	UNESCO and project partners	In the project inception report
Validation of the monitoring and evaluation approach, and reporting with clear and verifiable indicators and means of verification	UNESCO and project partners	In the project inception report

Description: The project team will build on the proposed M&E approach and, when required, can update the approach in accordance with the latest AF guidelines. M&E for the ESMP is further described in the text following this table.		
Periodic progress reporting as prescribed in the project management plan Description: Periodic progress reporting as prescribed in the project management plan, and as per AF guidelines. UNESCO, as the Implementing Entity, will prepare the final environmental and social assessment reporting for the AF and in a suitable format for people, communities, and other stakeholders involved in the project. A special section of the progress reports will be dedicated to stakeholders and vulnerable groups in each pilot area, including monitoring data on women's participation.	UNESCO and the PMU and teams working in pilot communities	Concurrent with scheduled M&E activities
Gender issues assessment and assurance of positive impacts and compliance Description: The Terms of Reference for a gender specialist engaged for the project will be prepared during the inception phase and the involvement of that specialist in M&E planning and monitoring will be ensured. The project manager will refer to the gender action plan for monitoring projects results in this area and supporting the meaningful participation of women in project activities.	Dedicated gender experts engaged from/through UNESCO	Ongoing
Project M&E activities, including systematic progress monitoring, collection of stakeholder feedback, and reviews M&E for the ESMP is further described in the text following this table.	UNESCO and project partners	Ongoing
Project Steering Committee assessment of compliance The role of the PSC is addressed in the table below on roles and responsibilities for ESMP implementation and monitoring.	Invited by UNESCO to assess and provide feedback	Concurrent with PSC meetings and additionally as required
Awareness and activation of grievance mechanism The grievance mechanism is further described in the text following this table.	UNESCO and the country project staff and experts	As needed.

ESMP Monitoring

Systematic progress monitoring and collection of stakeholder feedback and reviews. As the IE, UNESCO will establish a project M&E and reporting mechanism through which it will monitor and report on the following: 1) project progress and results (on the basis of verifiable indicators and means of verification) and 2) impact assessment and compliance with ESP

Principles. This will be done throughout project implementation. As the project will focus on the implementation of activities in pilot communities, monitoring and reporting processes will place particular emphasis on the local level and will include the following:

For the project as a whole and for each of the four pilot EWS communities and other communities participating in the complementary adaptation measures developed under Output 2.2 and implemented under Outputs 4.2, the UNESCO and the PMU will undertake the following steps:

1. Semi-annual workplan preparation and approval assessed by means of checklist on potential negative impacts and risks and for each of the fifteen Environmental and Social Core Principles (Table 4).
2. Upon completion of semi-annual workplans, country teams will be specifically requested to report any issues pertaining to adverse environmental and social impacts, and/or mitigation actions implemented or considered.
3. An annual summary statement / communique will be prepared on the basis of which further public consultations and associated activities can take place.
4. In each pilot area, a small representative committee of local and national stakeholders will be involved. This committee will approve/endorse:
    a. the overall outcome of the environmental and social impact assessments, and
    b. possible mitigation actions for unforeseen adverse impacts.

    As the project will focus implementation in the pilot areas, consultation and mobilization of project support and understanding by local stakeholders and their representatives is essential. If necessary, a grievance mechanism can be utilized (see ESMP 10).
5. National partners, in their supporting roles for project implementation will be involved in and support steps 1-4. This process will be overseen by UNESCO as IE and reported on at semi-annual project meetings. The ultimate responsibility for implementation of the M&E mechanism rests with the IE.

UNESCO and the project partners have in the project formulation and initial screening process (Concept Note and Proposal stage) carefully considered any potential direct, indirect, transboundary, and cumulative impacts in the project's area of influence. This assessment is supported and substantiated by considerable earlier and ongoing work on GLOFs and DRR by the project partners in the countries and regions involved. On this basis, it is concluded that project interventions are unlikely to have any serious adverse environmental or social impacts. Hence the project has been classified as Category B. The monitoring approach outlined in the section above will ensure - in case of doubt or due to unforeseen developments - that any potential risks can be mitigated, and any negative impacts prevented.

If, against expectations, project implementation generates negative environmental or social impact, it will be addressed through the M&E mechanism and reflected in periodic project reporting. Annual reporting on the project will include a section detailing the status of the ongoing environmental and social impacts and risks, as well as a consideration of gender issues. Reports will include, where necessary, a description of any corrective actions taken during the reporting period. The mid-term review and terminal evaluation reports will also include a detailed evaluation of the project's performance with respect to gender and environmental and social risks mitigation.

The following tables provides an overview of the roles and responsibilities of various project actors regarding ESMP implementation and oversight.

Table 7: Overview of responsibilities for ESMP implementation and monitoring by responsible party

Responsible Party	Role / Responsibility

Implementing Agency (UNESCO)	Ensure that the project complies at all times with AF ESP Principles. Oversee risk mitigation measures.
Executing Agency (Almaty Cluster Office)	Monitor ESMP implementation and ensure that the project adheres to all national and international legal and regulatory frameworks. Disseminate information on the ESMP and grievance mechanism to all stakeholders and participating communities. Assess the effectiveness of ESMP risk mitigation measures on an ongoing basis and adjust them as necessary.
Project Steering Committee	Review ESMP compliance during regularly scheduled meetings (and more frequently if indicated) and make recommendations as needed.
Project Manager	Oversee the ESMP implementation and the gender action plan.
Implementing Partners	Oversee compliance with all national and international legal and regulatory frameworks that are applicable to their associated project activities. Notify the project manager and the executing agency in the event that activities may result in unexpected environmental and/or social risks. Monitor the effectiveness of risk mitigation activities and document lessons learned.

Grievance Mechanism

All direct beneficiaries of the project and other related stakeholders will be informed about the grievance mechanism and the complaint-handling mechanism of the project. The IE with project partners will produce public information materials (leaflets and brochures) that explain the project, complete with detailed contact information of persons in charge (name, position, address, phone, email), and including access to information regarding the ad hoc complaint handling mechanism for the AF. These public information materials will be distributed during community consultations and general awareness-raising activities.

As part of the project's ESMP as well as progress and results monitoring, stakeholder feedback and reviews will be collected systematically. Focus will be placed on the results evaluation of tangible measures and activities in the four pilot areas (where the closest connections occur between stakeholder interests and needs and the intended effects and impacts of the project).

As part of the monitoring and evaluation process, a grievances modality will be set up - both for the project as a whole (as part of the project's website and information portal), and as part of the specific evaluation and progress data collection (M&E) in the pilot areas. This approach will allow concerned stakeholders to raise issues (anonymously if they wish), to the project management implementers at all levels of implementation.

The grievance mechanism process to be implemented in the project will be composed of five steps:

- Receipt and registration
- Acknowledgement
- Screening
- Investigation
- Response

In the event that the response leads to successful resolution of the grievance, the process will be closed out and the entire process will be documented. In the event that the response is not satisfactory to the affected parties, there will be an appeals process.

Overall, the grievance mechanism process will support receiving, evaluating, and addressing project-related grievances from local communities and other stakeholders. It will be possible to express grievances via submission on the website or by phone. Receipt of the grievance will always be acknowledged, recorded and subsequently investigated in a timely manner. Where relevant, resolved grievances will be included among the Frequently Asked Questions on the project website in order to prevent any future misunderstandings.

Unidentified Sub-Projects (USPs)

As noted in Section II.L, Outputs 2.1 and 2.2 involve the identification and design of USPs, while Outputs 4.1 and 4.2 involve the implementation of measures that are selected. The projects in question are classified as USPs for the following reason:

- Effective risk identification in line with the Adaptation Fund ESP is not possible for the EWS because the specific environment and social setting of the activity is not presently known.

Once the USPs under Components 2 and 4 have been identified and defined, they will be screened for compliance with the principles of the AF ESP to ensure that any potential unwanted impacts of these activities are anticipated, avoided, reduced, or mitigated. Activities will be rated by risk category (low, medium, high), which will determine what further action is required, and high-risk USPs will not be developed or implemented. Potential risks, whether social or environmental, will also be assessed at the community level. Any identified risks will be subject to monitoring and follow-up to ensure that planned mitigation measures are implemented and effective. All USPs that require further assessment, permitting, etc., will be closely supervised to ensure that they obtain the necessary approvals. Relevant legislation and regulations that pertain to potential USPs are listed in Section II.L. Tables 6 and 7 above provide additional information how the project will address risks related to USPs.

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

The performance of the action will be monitored on a regular basis through missions, reporting and assessments by interviewing the people involved, as well as through questionnaires. Regular monitoring will include an analysis by UNESCO's Field Offices (FOs) of the comprehensive reports and assessments prepared by consultants conducting capacity-building activities. The action implementation team will follow the action through regular communication with the national officials, consultants and AF delegations and will be available to intervene or initiate corrective action, as needed.

Dedicated support by the PMU of the UNESCO Cluster Office in Almaty will be provided on a regular basis. A comprehensive Results Framework of the project will be defined with execution indicators for project implementation as well as the respective means of verification. An M&E system for the project will be established based on these indicators and means of verification. Targeted M&E activities for the proposed project include the following:

A Project Inception Workshop will be conducted within three months of project start up with the full project team, relevant government counterparts and UNESCO. The Inception

Workshop is crucial for building ownership for the project and to finalize a work plan for the first year of the project. An objective of the Inception Workshop will be to present the modalities of project implementation and execution, document agreement for the proposed executive arrangements amongst stakeholders, and to assist the project team to understand and take ownership of the project's goals and objectives. Another key objective of the Inception Workshop is to introduce the project team which will be instrumental in project implementation. An Inception Workshop Report will be prepared and shared with participants to formalize agreements decided during the meeting.

A risk log will be regularly updated at intervals of no less than every six months in which critical risks to the project have been identified. Half yearly Progress Reports will be prepared by the PMU and verified by the Project Steering Committee. Annual Project Reports will be prepared to monitor progress made since the start of the project and in particular for the previous reporting period. These annual reports include, but are not limited to, reporting on the following:

• Progress made towards project objectives and project outcomes - each with indicators, baseline data and end-of-project targets;
• Project outputs delivered per project Outcome (annual);
• Lessons learned/good practices;
• Reporting on project risk management.

Government authorities, members of Steering Committees and PMU will conduct regular field visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress.

The project will undergo an independent Mid-Term Evaluation (MTE) at the mid-point of project implementation, which will determine progress being made toward the achievement of outcomes and identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. An external Terminal Evaluation (TE) will be conducted two months after project closure.

The following table provides a summary of the M&E plan and corresponding costs.

Table 8: Overview of M&E Activities

Type of M&E activity	**Responsible Parties**	**Budget US$ (excluding project team staff time)**	**Time frame**
Inception Workshop (IW) and Report	PMU, UNESCO	Indicative cost: 10,000	Within first three months of project start up
Measurement of Means of Verification for project indicators	PMU National Project Coordinators (NPC)	Indicative cost: 15,000	Start, mid and end of Project and annually when required

Annual and Quarterly Progress reviews	PMU, NPC	0 (staff time only)	Quarterly and Annually
Workplan Screening for Compliance with ESMP	PMU	0 (staff time only)	Bi-Annually
Steering Committee Meetings	PMU	Travel, indicative cost: 10,000	Following Project IW and subsequently at least once a year
Periodic status reports	PMU NPC	Indicative cost: 12,000	To be determined by PMU but following UNESCO regulations
Technical reports	PMU and NET	Indicative cost: 6,000	To be determined by PMU
Mid-term External Evaluation	PMU, NPC External Consultants (i.e. evaluation team)	Indicative cost: 20,000	At mid-point of planned project implementation.
Terminal Report	PMU UNESCO Local Consultants	0 (staff time only)	At least 1 month before the end of the project
Audit	UNESCO, PMU, NPC	Indicative cost: 90,000	At least 1 month before the end of the project
Visits to field sites	Project staff, Government representatives	Indicative costs: 17,000	At all stages of project implementation
Final Evaluation	PMU, UNESCO, Independent external Consultants	Indicative costs: 30,000	At least 1 month before the end of the project
TOTAL indicative COST		USD 210,000	

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

Table 9: Project Results Framework

Goal	**Communities in Central Asia are more resilient to natural disasters and climate change.**					
Project Strategy	**Objectively Verifiable Indicators**					
	Indicator	Baseline	Target	Sources of Verification	Assumptions	Responsibility
Objective: Strengthen adaptation to climate change in Central Asia by reducing societal risks and vulnerabilities associated with GLOFs	Number of beneficiaries (AF Core Indicator) [30] Early Warning Systems (AF Core Indicator) Category: Floods	0 1) Risk knowledge: 1. 2) Monitoring and warning service: 0-1. 3) Dissemination and communication: 0-1. 4) Response capability: 0.	*By the end of the project:* At least 1,400 direct beneficiaries (of that at least 700 women and 400 youth) and at least 89,000 indirect beneficiaries (of that 45,000 women and youth).[31] *By the end of the project:* 1) Risk knowledge: 3. 2) Monitoring and warning service: 3. 3) Dissemination and communication: 3. 4) Response capability: 3.	Site surveys; project documentation; independent MTR and TE Data records for EWS; Interviews	The political situation within and between participating countries will not change in a way that would jeopardize project activities and regional cooperation. Participating governments continue to see GLOFs as a threat to communities that requires action.	UNESCO
Outcome 1: Authorities in participating countries have improved knowledge of potential GLOF hazards and a coordinated national and regional approach to mapping and monitoring potential GLOF sites.						
Output 1.1: Appropriate mapping and monitoring strategies developed and endorsed	Number of authorities engaged in mapping and monitoring activities	20 authorities (and of that number, 10 women) consider themselves to be	*By the end of the project:* 40 authorities (and of that number, 20 women) consider themselves to be involved in GL mapping and monitoring	Interviews; GL mapping and monitoring strategies	Participating governments understand the value to shifting some resources and activities from disaster response to disaster prevention	PM NETs

[30] Core impact indicators are detailed in Tables 9A and 9B.

[31] Youth target for direct and indirect beneficiaries will be finalized pending the initiation of EWS work in pilot communities.

Goal	Communities in Central Asia are more resilient to natural disasters and climate change.					
Project Strategy	**Objectively Verifiable Indicators**					
	Indicator	Baseline	Target	Sources of Verification	Assumptions	Responsibility
	Presence of a strategy for GL mapping and monitoring	involved in GL mapping and monitoring No country-level strategies for GL mapping and monitoring	By the end of the project, each participating country has a GL mapping and monitoring strategy			
Output 1.2: Up-to-date atlas on glacier lakes for all participating countries based on remote sensing data developed and maintained	Percentage of watershed mapped for all participating countries	A very limited percentage of the watershed is mapped using older data; in situ measurements have been taken only in a few cases	By the end of the project, 347,000 km2 is mapped using recent (2015-2016) data	Atlas; project documentation	Participating countries will continue to have access to free satellite data and to retrospective watershed data	PMU NETs
Output 1.3: Organizational capacity to implement and oversee mapping and monitoring strengthened, with an emphasis on transboundary hazards.	Number of targeted institutions with increased capacity to minimize exposure to climate variability risks **(AF Output Indicator 2.1.2)** Number of capacity-strengthen	-- --	By the end of the project, 16 institutions have increased capacity to minimize exposure to climate variability risks By the end of the project, at least 4 regional	Workshop documentation, including papers and presentations; other project documentation; interviews	Government agencies and universities will allocate specialists and time to participate in conferences and capacity-strengthening activities	PMU NETs UZH

Goal	Communities in Central Asia are more resilient to natural disasters and climate change.					
Project Strategy	**Objectively Verifiable Indicators**					
	Indicator	Baseline	Target	Sources of Verification	Assumptions	Responsibility
	ing workshops		workshops and 8 workshops with local authorities have been conducted to strengthen monitoring capacity			
Outcome 2: Decision-makers and vulnerable households are aware of GLOF threats and have the necessary information to plan measures to adapt to those threats.						
Output 2.1: Vulnerability assessment and exposure maps developed for endangered communities, including gender and sector-specific analyses	Number of communities with exposure maps	One community has undergone hazard mapping, but this does not include gender and sector-specific analysis	By the end of the project, 8 communities (2 in each country) will have completed vulnerability assessments and exposure maps	Review of project documentation, community interviews	Communities will be receptive to the project and will participate actively in the mapping exercises. Sufficient data will be available for meaningful mapping.	PMU NETs
Output 2.2: Local knowledge on GLOF risks and related adaptation needs documented and local risk reduction plans drafted for selected communities vulnerable to GLOFs	Number and type of risk reduction actions or strategies introduced at local level **(AF Output Indicator 3.1.1)**	No local risk reduction plans exist in the pilot communities.	*By the end of the project:* At least 8 communities will participate in the development of a risk reduction strategy. At least 4 of the strategies will include EWS and complementary adaptation measures.	Risk reduction strategies; project documentation; community site visits.	Communities will be receptive to the project and will participate actively in the mapping exercises. Sufficient data will be available for meaningful mapping.	PMU NETs
Output 2.3: DRR and CCA concepts mainstreamed into sub-national development planning in	Number of targeted development strategies with incorporated climate change	DRR concepts are not mainstreamed into sub-national development plans.	By the end of the project, at least 8 local or district development plans include GLOF planning and response.	Development plans; project documentation.	Participating sub-national governments will support the integration of CCA issues into	PMU NETs Govt partners

Goal	**Communities in Central Asia are more resilient to natural disasters and climate change.**					
Project Strategy	**Objectively Verifiable Indicators**					
	Indicator	Baseline	Target	Sources of Verification	Assumptions	Responsibility
the relevant country context.	priorities enforced **(AF Output Indicator 7.2)**				development plans	
Outcome 3: A coordinated EWS network is designed and embedded in the institutional setting for disaster risk management at all levels.						
Output 3.1: Local to regional framework for EWS established and evaluated	Number of staff trained to respond to, and mitigate impacts of, climate-related events (by gender) **(AF Output Indicator 2.1.1)** DRM framework for GLOFs is integrated into country-level multi-hazard DRM frameworks	Approximately 24 staff in participating countries address DRR issues generally (including 12 women), but they lack specific expertise on GLOF risk reduction and management	24 staff have received specialized training or participated actively in the EWS framework (including 12 women)	Training logs; project documentation; interviews	Participating governments will allocate sufficient time and appropriate staff for training and capacity-strengthening activities. Governments continue to be receptive to the approach of having an integrated, multi-hazard DRR strategy	PMU NETs
Output 3.2: Design and implementation plans for four site-specific EWS completed	Site-specific studies for pilot communities	Vulnerable communities exposed to GLOFs lack EWS	*By the mid-point of the project:* Site-specific studies have been completed for each pilot community.	Pilot studies; documentation of equal participation by women in definition of community needs	Communities will not tamper with EWS installations	NETs UZH
Outcome 4: Pilot communities reduce risk from GLOF hazards and relevant agencies have a means of maintaining adaptation measures and upscaling to other vulnerable communities.						

Goal	**Communities in Central Asia are more resilient to natural disasters and climate change.**					
Project Strategy	**Objectively Verifiable Indicators**					
	Indicator	Baseline	Target	Sources of Verification	Assumptions	Responsibility
Output 4.1: EWS tested in selected vulnerable communities.	Presence of EWS system	None of the vulnerable communities surveyed has an EWS that monitors and responds directly to GLOF threats	*By the end of the project:* At least 4 communities have an EWS in operation.	Country-level project documentation; site visits; independent mid-term and terminal evaluation	EWS will be accepted by the communities	NETs UZH
Output 4.2 Complementary adaptation measures implemented	Presence of complementary adaptation measures	None of the vulnerable communities surveyed during the community consultations had undertaken any adaptation measures	*By the end of the project:* At least 4 pilot communities will have undertaken complementary adaptation options (such as work on channels and/or slope stabilization) in conformity with applicable regulations. At least 7 pilot communities will have undertaken low-cost / no-cost adaptation options (such as hazard zone demarcation, evacuation route planning, etc.)	Country-level project documentation; site visits; independent mid-term and terminal evaluation	Low-cost / no-cost measures will be accepted by the communities	NETs UZH
Output 4.3: Authorities and population	Percentage of targeted population	Community consultations	*By the end of the project*, at least 80% of people in the	Site visits; interviews; independe	Awareness-raising activities will	NETs UZH Local partners

Goal	**Communities in Central Asia are more resilient to natural disasters and climate change.**					
Project Strategy	**Objectively Verifiable Indicators**					
	Indicator	Baseline	Target	Sources of Verification	Assumptions	Responsibility
trained through simulation exercises and other means as needed.	aware of predicted adverse impacts of climate change, and of appropriate responses **(AF Output Indicator 3.1.1)** Of that number, percentage of women, vulnerable groups Number of training drills	indicated that while nearly all vulnerable community residents were concerned about climate change, far fewer could identify adverse impacts, and even fewer appropriate responses. Communities do not participate in hazard drills	target communities are aware of measures to adapt to climate change (and, of that, at least 50% women and youth / vulnerable groups) By the end of the project, all pilot communities have participated in at least 2 EWS drills.	nt mid-term and terminal evaluation	ensure that communities understand the importance of simulation exercises	
Output 4.4: Maintenance and financing strategy developed for ensuring long-term sustainability of the EWS and the expansion of adaptation activities to other vulnerable communities.	# of financing sources identified Presence of a maintenance and financing strategy	Governments have expressed interest, but funding has not been identified No maintenance and financing strategy exists	*By the end of the project:* At least one source of financing has been identified for each participating country. *By the end of the project:* Each participating country has a maintenance and financing strategy for	Project documentation; reporting on support received; government gazettes.	Country-level interest and international interest in support for EWS will remain strong.	PMU NETs

Goal	**Communities in Central Asia are more resilient to natural disasters and climate change.**					
Project Strategy	**Objectively Verifiable Indicators**					
	Indicator	Baseline	Target	Sources of Verification	Assumptions	Respons ibility
			the EWS systems			
Outcome 5: Researchers, government authorities, and communities can access and exchange information they need on GLOF hazards and risk reduction measures to adapt to them.						
Output 5.1: Web-based knowledge-platform established on GLOF risks and adaptation strategies.	Usage of web platform Number of stakehold ers who are aware of the platform and who access it more than once.	Several climate change web platforms exist with informatio n on Central Asia, but they do not contain informatio n on GLOFs.	*By the end of the project:* The web platform has at least 100 unique visitors annually from within the participating countries.	Website; user statistics	Target community will have consistent access to the internet and skills necessary to obtain information from the platform	PMU
Output 5.2: Education and training programmes undertaken to equip stakeholders with knowledge and capacity to prepare for, respond to and recover from GLOF disasters.	Number of staff trained to respond to, and mitigate impacts of, climate-related events, by gender ***(AF Output Indicator 2.1.1)***	GLOF response training is not specificall y provided to governme nt staff.	By the end of the project: 24 staff, and of that number 12 women, trained to respond to, and mitigate impacts of GLOFs	Training logs; other project documenta tion.	Staff will have sufficient time and interest to participate meaningfully in training.	PMU UZH
Output 5.3: Knowledge and lessons learned from the targeted demonstration projects disseminated within Central Asia and across other high mountain regions.	Extent to which project lessons are scaled up to other communiti es in Central Asia Number of knowledg	-- Local communiti es lack	*By the end of the project:* Lessons learned from the project will be incorporated in at least 16 communities at risk of GLOFs. *By the end of the project:* At least 6 knowledge		People and finances will be sufficient to replicate elements of the project approach in additional communities. Project knowledge will be codified on a regular basis	PMU NETs UZH Local partners

Goal	Communities in Central Asia are more resilient to natural disasters and climate change.					
Project Strategy	**Objectively Verifiable Indicators**					
	Indicator	Baseline	Target	Sources of Verification	Assumptions	Respons ibility
	e products for institutions supporting mountain communiti es and for people at risk	accessibl e, targeted materials on GLOF response.	products have been produced and distributed to disseminate good practice and lessons learned from the project.		through implementatio n. Other communities will perceive the relevance of the lessons learned through the project.	

Table 9A: Summary Table for AF Core Impact Indicator "Number of Beneficiaries"

Adaptation Fund Core Impact Indicator "Number of Beneficiaries"				
Date of Report				
Project Title	Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate			
Country	Multi-Country (Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan)			
Implementing Agency	UNESCO			
	Baseline	Target at Project Approval	Adjusted Target First Year of Implementation	Actual at Completion
Direct Beneficiaries Supported by the Project	0	1,400		
Female Direct Beneficiaries	0	700		
Youth Direct Beneficiaries[32]	0	400		
Indirect Beneficiaries Supported by the Project	0	89,000		
Female Indirect Beneficiaries	0	45,000		

[32] Youth target will be finalized upon the final selection of the pilot communities that will receive the EWS and those that receive other adaptation measures. The project will strive for equal representation of young women and young men among youth beneficiaries.

Youth Indirect Beneficiaries[33]	0	45,000		

Table 9B: Summary Table for AF Core Impact Indicator "Early Warning Systems"

Adaptation Fund Core Impact Indicator "Early Warning Systems"				
Date of Report				
Project Title	Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate			
Country	Multi-Country (Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan)			
Implementing Agency	UNESCO			
	Baseline	Target at Project Approval	Adjusted Target First Year of Implementation	Actual at Completion
Adopted Early Warning Systems *(Category targeted – 1, 2, 3, 4; and absolute number)* *(1) risk knowledge,* *(2) monitoring and warning service,* *(3) dissemination and communication,* *(4) response capability.*	*(1) risk knowledge = 1* *(2) monitoring and warning service = 0/1* *(3) dissemination and communication = 0/1* *(4) response capability = 0*	*(1) risk knowledge = 3* *(2) monitoring and warning service = 3* *(3) dissemination and communication = 3* *(4) response capability = 3*		
Hazard *(select from the list on page 2)*	Floods (for all components)	Floods (for all components)		

[33] Youth target will be finalized upon the final selection of the pilot communities that will receive the EWS and those that receive other adaptation measures. The project will strive for equal representation of young women and young men among youth beneficiaries.

Geographical coverage *(km2)*		Component 1:[34] 347,000 km^2 Components 2-4:[35] 6,255 km^2		
Number of municipalities	0	7 (for Components 3 and 4)		

[34] Of that: 47,000 km^2 in Kazakhstan, 170,000 km^2 in Kyrgyzstan, 110,000 km^2 in Tajikistan, and 20,000 km^2 in Uzbekistan.

[35] This total reflects the EWS catchment area for communities in the four participating countries as follows: 1,300 km^2 in Kazakhstan (2 communities); 1,150 km^2 in Kyrgyzstan (2 communities); 1,905 km^2 in Tajikistan 1 community; and 1,900 km^2 in Uzbekistan (2 communities).

F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

Table 10: Project Alignment with the Adaptation Fund Results Framework

Project Objective(s)[36]	**Fund Outcome**	**Fund Outcome Indicator**	**Grant Amount (USD)**
Strengthen adaptation to climate change in Central Asia by reducing societal risks and vulnerabilities associated with GLOFs	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	6,500,000
Project Outcome(s)	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)**
Authorities in participating countries have improved knowledge of potential GLOF hazards and a coordinated national and regional approach to mapping and monitoring potential GLOF sites.	Output 2: 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) or 2.1.2 No. of targeted institutions with increased capacity to minimize exposure to climate variability risks (by type, sector and scale)	820,000
Decision-makers and vulnerable households are aware of GLOF threats and have the necessary information to plan measures to adapt to those threats.	Output 7: Improved integration of climate-resilience strategies into country development plans	7.2. No. of targeted development strategies with incorporated climate change priorities enforced	1,364,800
A coordinated EWS network is designed and embedded in the institutional setting for disaster risk management at all levels.	Output 1.2: Targeted population groups covered by adequate risk reduction systems	1.2.1. Percentage of target population covered by adequate risk-reduction systems	1,070,000
Pilot communities reduce risk from GLOF hazards and relevant agencies have a means of maintaining adaptation measures and upscaling to other vulnerable communities.	Output 1.2: Targeted population groups covered by adequate risk reduction systems	1.2.1. Percentage of population covered by adequate risk-reduction systems	1,763,444
	Output 3: Targeted population groups participating in adaptation and risk reduction awareness activities	3.1.1 No. and type of risk reduction actions or strategies introduced at local level	
Researchers, government authorities, and communities can access	Output 2: Strengthened capacity of national and sub-	2.1.2 No. of targeted institutions with increased capacity to	910,000

[36] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

and exchange information they need on GLOF hazards and risk reduction measures to adapt to them.	national centres and networks to respond rapidly to extreme weather events	minimize exposure to climate variability risks (by type, sector and scale)	

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.

Table 11: Budget by Outputs

	Budget $
COMPONENT 1: Strengthening national and regional capacity to monitor and assess GLOF hazards	-
Outcome 1: Authorities in participating countries have improved knowledge of potential GLOF hazards and a coordinated national and regional approach to mapping and monitoring potential GLOF sites.	
Activity 1 - Output 1.1: Appropriate mapping and monitoring strategies developed and endorsed	70,000.00
Activity 2 - Output 1.2: Up-to-date atlas on glacier lakes for each country based on remote sensing data developed and maintained	300,000.00
Activity 3 - Output 1.3: Organizational capacity to implement and oversee mapping and monitoring strengthened, with an emphasis on regional cooperation on transboundary hazards	450,000.00
Total Outcome 1	**820,000.00**
COMPONENT 2: Strengthening sub-national, national, and regional policies and approaches to address the needs of vulnerable communities	
Outcome 2: Decision-makers and vulnerable households are aware of GLOF threats and have the necessary information to plan measures to adapt to those threats	
Activity 4 - Output 2.1: Vulnerability assessment and exposure maps developed for endangered communities, including gender and sector-specific analyses	250,000.00
Activity 5 - Output 2.2: Local risk reduction plans drafted for selected communities vulnerable to GLOFs	590,000.00
Activity 6 - Output 2.3: DRR and CCA concepts mainstreamed into sub-national development planning in the relevant country context	524,800.00
Total Outcome 2	**1,364,800.00**
COMPONENT 3: Design and launch of EWS and risk reduction measures tailored to local contexts	
Outcome 3: A coordinated EWS network is designed and embedded in the institutional setting for disaster risk management at all levels	
Activity 7 - Output 3.1: Local to regional framework of institutional DRR context established and evaluated	62,400.00
Activity 8 - Output 3.2: Design and implementation plans for four site-specific EWS completed	1,007,600.00

Total Outcome 3	**1,070,000.00**
COMPONENT 4: Targeted demonstration projects to introduce technologies and best practices for EWS for glacier lakes	
Outcome 4: Pilot communities reduce risk from GLOF hazards and relevant agencies have a means of maintaining adaptation measures and upscaling to other vulnerable communities	
Activity 9 - Output 4.1: EWS tested in selected vulnerable communities	1,180,000.00
Activity 10 - Output 4.2: Complimentary adaptation measures implemented	500,000.00
Activity 11 - Output 4.3: Authorities and population trained through simulation exercises and other means as needed	68,444.00
Activity 12 - Output 4.4: Maintenance and financing strategy developed for ensuring long-term sustainability of the EWS and the expansion of adaptation activities to other vulnerable communities	15,000.00
Total Outcome 4	**1,763,444.00**
COMPONENT 5: Knowledge exchange, stakeholder engagement, and communication	
Outcome 5: Researchers, government authorities, and communities can access and exchange information they need on GLOF hazards and risk reduction measures to adapt to them	
Activity 13 - Output 5.1: Web-based knowledge-platform established on GLOF risks and adaptation strategies	130,000.00
Activity 14 - Output 5.2: Education and training programmes undertaken to equip stakeholders with knowledge and capacity to prepare for, respond to and recover from GLOF disasters	476,038.00
Activity 15 - Output 5.3: Knowledge and lessons learned from the targeted demonstration projects disseminated within Central Asia and across other high mountain regions	303,962.00
Total Outcome 5	**910,000.00**
Project Execution Cost (Activity 16)	
Cost recovery (Internal UNESCO Staff time (P) - P-3 in Almaty Cluster Office)	44,712
Cost recovery (Internal UNESCO Staff time (P) - D-1 in Almaty Cluster Office)	13,095
Cost recovery (Internal UNESCO Staff time (G) - L-7 in Almaty Cluster Office)	5,468
Steering Committee Meetings	10,000
Visits to field sites	17,000
Total Project Execution Cost	**90,275**
Total project costs (direct costs)	**6,018,519**
IE fee 8%	**481,481**
AMOUNT OF FINANCING REQUESTED	**6,500,000**

Table 12: Activity Based Budget

Adaptation Fund

Activity Based Budget

Project title: Reducing vulnerabilities of populations in the Central Asia region from glacier lake outburst floods in a changing climate

Date submitted: 1/20/2020

Implementing organisation: UNESCO Office in Almaty

Project duration: 5 years

Project cost: $ 6,500,000

Total cost	$ 6,500,000
Year 1	$ 830,033
Year 2	$ 2,127,869
Year 3	$ 1,964,830
Year 4	$ 749,043
Year 5	$ 828,225

COMPONENT 1: Strengthening national and regional capacity to monitor and assess GLOF hazards

OUTCOME 1: Authorities in participating countries have improved knowledge of potential GLOF hazards and a coordinated national and regional approach to mapping and monitoring potential GLOF sites

Activity 1 - Output 1.1: Appropriate mapping and monitoring strategies developed and endorsed

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Contracts for Services with organizations	35000	35,000				$70,000.00
Subtotal						**$70,000.00**

Activity 2 - Output 1.2: Up-to-date atlas on glacier lakes for each country based on remote sensing data developed and maintained

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Contracts for Services with organizations / Iplementation partners agreement	150000	150,000				$300,000.00
Subtotal						**$300,000.00**

Activity 3 - Output 1.3: Organizational capacity to implement and oversee mapping and monitoring strengthened, with an emphasis on regional cooperation on transboundary hazards

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Service Contracts for National Coordinators in 4 countries	20000	20,000	20,000	20,000	20,000	$100,000.00
Contracts for Services with organizations	50000	50000	50000	50000	50000	$250,000.00
Individual Consultants	20000	20000	20000	20000	20000	$100,000.00
Subtotal						**$450,000.00**

Total OUTCOME 1						**$820,000.00**

COMPONENT 2: Strengthening sub-national, national, and regional policies and approaches to address the needs of vulnerable communities

OUTCOME 2: Decision-makers and vulnerable households are aware of GLOF threats and have the necessary information to plan measures to adapt to those threats

Activity 4 - Output 2.1: Vulnerability assessment and exposure maps developed for endangered communities, including gender and sector-specific analyses

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Contracts for Services with organizations	30000	40,000	60,000	60,000	60,000	$250,000.00
Subtotal						**$250,000.00**

Activity 5 - Output 2.2: Local risk reduction plans drafted for selected communities vulnerable to GLOFs

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
International consultants	20,000	20,000				$40,000.00
International consultants			20,000	20,000	20,000	$60,000.00
Contracts for Services with organizations / IPAs	50000	50,000	130,000	130,000	130,000	$490,000.00
Subtotal						**$590,000.00**

Activity 6 - Output 2.3: DRR and CCA concepts mainstreamed into sub-national development planning in the relevant country context

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Service Contracts for National Coordinators in 4 countries	30000	30000	30000	30000	30000	$150,000.00
Contracts for Services with organizations	60000	60000	71,600	71,600	71,600	$334,800.00

Travel	20000	20000				$40,000.00
Subtotal						**$524,800.00**

Total OUTCOME 2						**$1,364,800.00**

COMPONENT 3: Design and launch of EWS and risk reduction measures tailored to local contexts

OUTCOME 3: A coordinated EWS network is designed and embedded in the institutional setting for disaster risk management at all levels

Activity 7 - Output 3.1: Local to regional framework of institutional DRR context established and evaluated

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Service Contracts for National Coordinators in 4 countries	12480	12480	12480	12480	12480	$62,400.00
Subtotal						**$62,400.00**

Activity 8 - Output 3.2: Design and implementation plans for four site-specific EWS completed

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Individual consultants		36,350				$36,350.00
Travel	10000	10,000	10000	10000	10000	$50,000.00
Contracts for Services with organizations / IPAs		563,650	357,600			$921,250.00
Subtotal						**$1,007,600.00**

Total OUTCOME 3						**$1,070,000.00**

COMPONENT 4: Targeted demonstration projects to introduce technologies and best practices for EWS for glacier lakes

Outcome 4: Pilot communities reduce risk from GLOF hazards and relevant agencies have a means of maintaining adaptation measures and upscaling to other vulnerable communities

Activity 9 - Output 4.1: EWS tested in selected vulnerable communities

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Local consultants	10,000	20,000	20,000	20,000	20,000	$90,000.00
International consultants		30,000	20,000			$50,000.00
Travel		10,000	20,000	10,000		$40,000.00
Equipment for EWS installation in 4 pilot sites		260,000	400,000			$660,000.00

Contracts for Services with organizations		140,000	200,000			$340,000.00
Subtotal						**$1,180,000.00**

Activity 10 - Output 4.2: Complementary adaptation measures implemented

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
International consultants		15,000				$15,000.00
Training Workshop and Conference		10,000				$10,000.00
Contracts for Services with organizations		175,000	200,000	100,000		$475,000.00
Subtotal						**$500,000.00**

Activity 11 - Output 4.3: Authorities and population trained through simulation exercises and other means as needed

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Individual consultants					8,000	$8,000.00
Contracts for Services with organizations					10,000	$10,000.00
Training Workshops and Conferences					40,000	$40,000.00
Miscellaneous (other supplies for conferences, e.g. stationery, bags, etc.)					10,444	$10,444.00
Subtotal						**$68,444.00**

Activity 12 - Output 4.4: Maintenance and financing strategy developed for ensuring long-term sustainability of the EWS and the expansion of adaptation activities to other vulnerable communities

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Individual consultants					15,000	$15,000.00
Subtotal						**$15,000.00**

Total OUTCOME 4						**$1,763,444.00**

COMPONENT 5: Knowledge exchange, stakeholder engagement, and communication

Outcome 5: Researchers, government authorities, and communities can access and exchange information they need on GLOF hazards and risk reduction measures to adapt to them

Activity 13 - Output 5.1: Web-based knowledge-platform established on GLOF risks and adaptation strategies

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total

Local consultants	30,000		5,000	5,000	5,000	$45,000.00
International consultants	20,000					$20,000.00
Equipment	10,000					$10,000.00
Contracts for Services with organizations	30,000	10,000	5,000	5,000	5,000	$55,000.00
Subtotal						**$130,000.00**

Activity 14 - Output 5.2: Education and training programmes undertaken to equip stakeholders with knowledge and capacity to prepare for, respond to and recover from GLOF disasters

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Service contract for project assistant / National coordinators	12000	12000	12000	12000	12000	$60,000.00
Individual Consultants	10000	5,000	5,000	6,738		$26,738.00
Travel	10000	10,000	10,000	10,000	9,000	$49,000.00
Contracts for Services with organizations	40000	40,000	40,000	30,000	30,000	$180,000.00
Project Administrator (Service contract)	27060	27060	27060	27060	27060	$135,300.00
Training Workshop and Conference		5000	5000	5000		$15,000.00
Inception Workshop and Report	10000					$10,000.00
Subtotal						**$476,038.00**

Activity 15 - Output 5.3: Knowledge and lessons learned from the targeted demonstration projects disseminated within Central Asia and across other high mountain regions

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Individual consultants	10000	20,000	10,000	5,000		$45,000.00
Measurement of Means of Verification for project indicators (IC contract, $3,000 per year)	3000	3000	3000	3000	3000	$15,000.00
Periodic status reports (IC contract, $2400 per year)	2400	2400	2400	2400	2400	$12,000.00
Technical reports (IC contract, $1200 per year)	1200	1200	1200	1200	1200	$6,000.00
Contracts for Services with organizations	5000	20,000	7,500	5,000	6,490	$43,990.00
Mid-term External Evaluation (IC contracts)			20,000			$20,000.00
Final Evaluation (IC contracts)					30,000	$30,000.00
Audit					90,000	$90,000.00
Training Workshops and Conferences		10,000	7,000	4,972		$21,972.00
Miscellaneous (other supplies for conferences, e.g. stationery, bags, etc.)	10000	10,000				$20,000.00
Subtotal						**$303,962.00**

Total OUTCOME 4						**$910,000.00**

Activity 16 - Project Execution Cost						
Item	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Cost recovery (Internal UNESCO Staff time (P) - P-3 in Almaty Cluster Office)	11,040	8,280	8,280	8,280	8,832	$44,712
Cost recovery (Internal UNESCO Staff time (P) - D-1 in Almaty Cluster Office)	2,619	2,619	2,619	2,619	2,619	$13,095
Cost recovery (Internal UNESCO Staff time (G) - L-7 in Almaty Cluster Office)	1,350	810	1,148	810	$1,350.00	$5,468
Steering Committee Meetings	2000	2000	2000	2000	2000	$10,000
Visits to field sites	3400	3400	3400	3400	3400	$17,000
Total Project Execution Activities						**$90,275**

Total project costs (direct costs)	**$6,018,519**
IE fee 8%	**$481,481**
AMOUNT OF FINANCING REQUESTED	**$6,500,000**

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

Table 13: Project Disbursement Schedule

	Upon Agreement Signature	First Disbursement (rcd. at time of agreement)	One year after project start	Y3	Y4	Y5	**Total**
Scheduled Date		01/06/2020	01/06/2021	01/06/2022	01/06/2023	01/06/2024	
Project Funds		768,549	1,970,249	1,819,287	693,559	766,875	6,018,519
Implementing Entity Fee		61,484	157,620	145,543	55,485	61,349	481,481
TOTAL		830,033	2,127,869	1,964,830	749,044	828,224	6,500,000

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

A. Record of endorsement on behalf of the government[37] *Provide the name and position of the government official and indicate date of endorsement for each country participating in the proposed project / programme. Add more lines as necessary. The endorsement letters should be attached as an annex to the project/programme proposal. Please attach the endorsement letters with this template; add as many participating governments if a regional project/programme:*

Mr. Olzhas Agabekov, Head, Climate Change Department, Republic of Kazakhstan	July 23, 2019.
Mr. Mirslav Amankulov, Director, State Agency of Environment Protection and Forestry, Kyrgyz Republic	February 3, 2020
Mr. G.K. Gulmahmadzoda, Chairman of the Committee for Environmental Protection Ministry of Foreign Affairs Republic of Tajikistan	July 29, 2019
Mr. Bakhriddin Nishonov, First Deputy Director General, Uzhydromet, Republic of Uzbekistan	July 18, 2019

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 *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

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 (Kazakhstan 2050 Strategy; National Action Plan for Climate Change Mitigation of the Republic of Tajikistan; National Strategy of Sustainable Development of Uzbekistan) 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.
Krista Pikkat, Director, UNESCO Cluster Office in Almaty Implementing Entity Coordinator

Date: *19.02.2020*	Tel. and email: +7 7272 582643 ext. 502; e-mail: k.pikkat@unesco.org
Project Contact Person: **Kristine Tovmasyan**, Dr, Programme Specialist, UNESCO Cluster Office in Almaty	
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