2 February 2022

Adaptation Fund Board

ADAPTATION FUND PORTFOLIO MONITORING MISSION IN THE WEST AFRICA VOLTA BASIN – BENIN, CÔTE D'IVOIRE, GHANA

EXECUTIVE SUMMARY

From 21 November to 2 December 2022, an Adaptation Fund Board Secretariat-led Project Monitoring Mission was conducted in the West Africa Volta Basin for the project, “Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin.” The project is implemented by the World Meteorological Organization and executed by the same entity along with the Volta Basin Authority and the Global Water Partnership West Africa. The goal of the project is to provide the first large scale and transboundary implementation of an integrated flood and drought management system.

The Mission incorporated visits to Benin, Côte d’Ivoire, and Ghana with the objectives of (i) gathering lessons learned, (ii) collating empirical lessons from the regional approach, and (iii) drawing lessons from regional-level interinstitutional coordination frameworks and policies for integrated flood and drought management.

Overall, the four-year regional project continues to build capacity related to flood and drought management, especially at the local level. Implementation efforts were viewed first-hand at two project sites in Benin and Ghana, where residents and stakeholders explained their implementation efforts against flood and drought and perceived benefits from the soon-to-be-launched early warning system.

Key institutional lessons learned include how the project’s basin-level regional approach enables economies of scale by avoiding individual country agreements; this along with the benefits of addressing diverse situations across large areas using adaptive management among stakeholders.

Project-specific lessons learned include how the management of shared data through the early warning system relates well to the original pilot program criteria of linking web-based knowledge and management systems. It was equally noted how the project continues to bring together regional actors, plus strengthen the regional weather forecast system. A key recommendation highlights how the benefit of regional political and economic union backing is important to successfully implement regional adaptation activities, notably in terms of facilitating data sharing.

This report highlights the Volta Basin project progress via the interinstitutional coordination framework and lessons learned from concrete adaptation practices as of December 2022.

ADAPTATION FUND

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INTRODUCTION

Background and scope of the mission

1. At its 28th meeting, the Adaptation Fund Board (AFB) approved the updated Knowledge Management (KM) Strategy and Work Plan for the Fund; the Medium-Term Strategy (MTS) of the Fund was also approved at its 30th meeting. Under Component 1 of the strategy, "Capture and Transfer Knowledge related to Adaptation, Accreditation, Direct Access, and the monetization of Certified Emissions Reduction," conducting missions to projects/programs under implementation is one way to further collect and analyze lessons learned at a portfolio level. In this context, the Project Monitoring Mission (PMM) for projects under implementation supports the analysis and knowledge sharing of lessons learned and best practices, such as can be found in this report.

2. As part of the Knowledge Management and Mid-term strategies, the Adaptation Fund Board will systematically use information from its funded projects/programs under implementation as well as from its unique decision-making structure and operations to enhance countries' capacity and knowledge to improve the design and increase the effectiveness of future adaptation projects/programs. The information gained will equally inform its decision making, enhance transparency, and improve the Fund's overall effectiveness.

3. In October 2022, the Fund approved a new five-year strategy starting in 2023 that will further build on the Fund's strategic pillars of Action, Innovation, and Learning and Sharing, with the increased ambition to help meet the adaptation needs of vulnerable countries. This new strategy was launched during the 2022 Conference of Parties (COP 27) in Egypt and will continue to support PMMs through 2027.

4. Twenty PMMs have been organized thus far, and the West Africa portfolio mission was the first regional PMM. The selected project titled "Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin" (VFDM) is implemented by the World Meteorological Organization (WMO) and executed by WMO, the Volta Basin Authority (VBA), and the Global Water Partnership West Africa (GWP-WAF hereby referred to as GWP).

5. The objective of the WMO implemented VFDM project is to provide the first large scale and transboundary implementation of an integrated flood and drought management system. It aims to empower the National Meteorological and Hydrological Services (NMHS) and other competent authorities of six riparian countries (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, and Togo) with robust and innovative solutions for disaster risk reduction and climate change adaptation, including ecosystem-based solutions and gender-sensitive participatory approaches. As part of the project, an early warning system (EWS) is being designed to reach the civil security services and other private and public stakeholders.

6. The four-year regional project was selected for several reasons including (i) the opportunity to learn from concrete adaptation practices, such as the roll-out of a transboundary end-to-end early warning system for floods, (ii) its regional dimension – the project is implemented across six countries in West Africa, (iii) expectations for the mission to yield significant learning for the funding window for regional projects and programs started as a pilot program in 2014 and

established as a permanent funding window in 2016, and (iv) expected learning opportunities from interinstitutional coordination frameworks and policies for integrated flood and drought management at the regional level.

7. The PMM planned to capitalize on the VFDM project's selection criteria focusing on three objectives: (i) gather lessons learned from the roll-out of improved transboundary flood and drought forecasting instruments and Early Warning Systems aimed at reducing disaster risks in vulnerable communities, (ii) collate empirical lessons from the regional approach promoted by the pilot program for regional projects and programs, and (iii) draw lessons from interinstitutional coordination frameworks and policies for integrated flood and drought management at the regional level

The Volta Basin covers 400,000 km² and contains an estimated 30-34 million people, all of whom are vulnerable to flood and drought. credit WMO

8. Overall, the four-year regional VFDM project continues to build capacity related to flood and drought management, especially at the local level. Implementation efforts were viewed first-hand at two project sites in Benin and Ghana, where residents explained their implementation efforts against flood and drought and perceived benefits from the soon-to-be-launched EWS. In Northern Benin for example, the regional implementing agency introduced the mission to the local project committee, who explained their efforts to warn against flooding. These efforts included marking water levels on houses indicating when a resident should seek shelter outside their home. The mission also observed an installed weather station within the community and heard from the committee on their role hosting the station.

9. A recent Adaption Fund study shows transboundary adaptation actions that involve multiple countries can successfully manage climate risk and achieve positive results. These results are achieved with effective project coordination and arrangements that help to save costs.[1] In the Volta Region, WMO-organized workshops at the national level help to gather information on the challenges the region is facing, saving costs and effort compared to seeking information from multiple sites. One such workshop was directly viewed by the mission taking place in Ghana and involved all six riparian countries. Additionally, WMO uses its subregional offices as an important link between the national project teams and WMO Secretariat to coordinate project implementation. The mission visited national and sub-regional offices in three countries and heard directly from the community coordinators.

[1] Transboundary Approaches to Climate Adaptation: Lessons Learned from the Adaptation Fund's Regional Projects and Programmes – April 2022

10. Certain challenges remain including the need for a more focused handover and exit plan. The mission also observed that the speed of implementation did not always match the ability of project implementors, causing delays. These challenges may impact the VFDM project's overall progress and will need to be addressed to ensure flood and drought management efforts remain coordinated by regional actors.

11. This report highlights the VFDM project progress via the interinstitutional coordination framework and lessons learned from concrete adaptation practices as of December 2022. Information in this report is categorized by topic and not by country, per the nature of the transboundary approach. Final evaluations of the project's sustainability, effectiveness, efficiency, and relevance will be carried out during the VFDM project's terminal evaluation.

Methodology

12. The Volta Basin PMM was conducted by the Adaptation Fund Board Secretariat with support of the WMO, VBA, and GWP. WMO is the implementing entity of the project, which is executed by the WMO, VBA, and GWP. The mission took place from 21 November to 2 December 2022 and incorporated visits to Benin, Côte d'Ivoire, and Ghana. The mission followed the Terms of Reference noted in section seven of this report. Three ministry office meetings were held, one regional office meeting attended, three workshops observed, and two project sites visited.

13. The PMM received direct feedback from stakeholders and was able to interact with partners and beneficiaries. Using qualitative observation through interviews and stakeholder interaction, the PMM gathered findings, lessons learned, and progress updates during the visit, as well as elements related to ecosystem-based solutions and gender-sensitive participatory approaches. The PMM equally recorded the progress of the EWS and its eventual 2023 launch.

VFDM PROJECT CONTEXT AND PROGRESS TO DATE

Volta Basin heavily impacted by climate change

14. The geographic setting of the Volta Basin remains highly vulnerable to meteorological and hydrological events. Over the last 20 years, almost two million people have been affected by floods in the Basin, which covers 400,000 km2 and extends from semi-arid to sub-humid areas. Key affected stakeholders are mainly people working in the agricultural sector (68 percent of the population). Due to the lack of land-use planning and alternatives, they mostly live in areas prone to risks such as valley and mountain slopes, which are particularly vulnerable to floods and landslides.

Resident of Kunkua, Ghana explains impact of climate change on her area, plus adaptation activities she is helping to organize through the local committee.

15. Besides exposure to riverine floods, highly intense pluvial events cause localized floods, which are particularly devastating in urban areas. Such events negatively impact socio-economic development and are exacerbated by a climate that has undergone considerable change in recent decades. The climate is expected to continue changing throughout the 21st century. Through various studies, climate predictions foresee a mean annual reduction of precipitation and an increase of temperature in the Volta Basin. This will modify the current distribution of water resources over the different climatic zones, therefore aggravating an already existing situation of conflict between the competing uses.

16. The VFDM project assists the six countries in the implementation of coordinated and joint measures to improve their existing management plans at the regional, national, and local level and to build on the lessons learned from the past and current projects related to disaster risk reduction and climate adaptation. The six riparian countries benefit not only from a basin-wide transboundary management framework to ensure long-term environmental and economic development, but from concrete solutions to alleviate a potential increase of vulnerability and to build an effective network of actors.[2]

17. The VFDM project has the ambition to provide the first large scale and transboundary implementation of integrated flood and drought management. To achieve this, the project supports the National Meteorological and Hydrological Services and other competent authorities of the six riparian countries with robust solutions aimed at disaster risk reduction and mitigating climate impacts, including the capacity development for nature-based solutions and gender-sensitive participatory approaches. The VFDM project achieves its objectives through three components:

Project component 1: Develop capacity and established frameworks at the local, national, and regional levels to ensure risk informed decision-making.	US$ 1.5 million
Project component 2: Develop concrete adaptation and environmentally friendly actions with an integrated approach.	US$ 4 million
Project component 3: Strengthen policy and institutional capacity for integrated flood and drought management at the local, national, and transboundary levels.	US$ 1 million

18. The key intervention of the project is the launch of an end-to-end EWS for flood and drought management scheduled for early 2023. This system aims to support national civil protection services and other private and public stakeholders that are potentially vulnerable to flood and drought-related hazards.

[2] Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Togo) – Project Documents 2018-2019.

Progress to Date

19. The Adaptation Fund Board approved the VFDM project through Decision B.32/27 in October 2018, which was submitted by WMO in the requested amount of US$7.92 million. Implementation began in June 2019, with a planned duration of four years. A recent, no-cost extension was granted for an additional year due to delays experienced from the COVID-19 pandemic. To date, the trustee has transferred US$7.22 million of the approved amount (91 percent).[3]

20. Starting in April 2022, the VFDM project went through a mid-term evaluation process, the report of which was finalized and submitted to the Adaptation Fund Board secretariat in June 2022. The Mid-Term Evaluation Report (MTR) reiterated the high relevance of the project for the Volta Basin, since more than 19 million individuals are experiencing the impact of climate change, mostly flood and drought.

21. The MTR noted the high level of organization at the community level with awareness campaigns, and varying workshops organized at the national level. The regional workshops were successful in bringing actors together however, poor organization led to some agencies not feeling fully involved. This was partly due to budget limitations to involve all structures or participants from each agency. Another challenge noted from the MTR was the lack of a Basin-wide modelling system operational at the regional level and lack of preparation to share hydro-meteorological (hydromet) data for the future operator of the EWS. Updates to other challenges noted in the MTR are addressed in this report.

22. During the PMM, WMO noted the following progress per component:

Component 1 -- Risk-informed decision making:

- Risk maps have been developed,
- Climate scenarios have been developed,
- Long-term risk management strategies advanced.

Component 2 -- Concrete adaptation and environmentally friendly actions:

- Early warning system under development,
- Pilot sites chosen,
- Awareness of stakeholders on Nature-based solutions has been raised,
- Gender mainstreaming has started but remains a challenge.

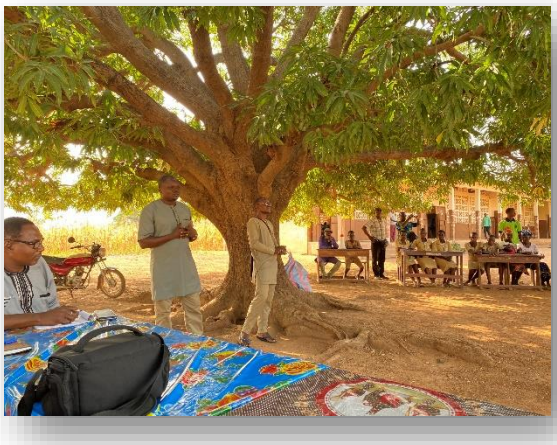
Component 3 -- Strengthened policy and institutional capacity:

- Capacity of policymakers has been reinforced,
- Local collaboration remains high.

[3] Adaptation Fund Project Performance Report (PPR)-III - June 2021-June 2022.

23. Significant progress has indeed been made since the MTR, especially with the development of the EWS known as VOLTALARM, which is operated on the myDEWETRA platform hosted by the International Center on Environmental Monitoring (CIMA). VOLTALARM now benefits from additional databases, which offer real-time information. Vulnerability maps have been produced in 60 communities within 6 pilot sites of the Basin. The cloud-based interface is operational and will be fully launched in 2023. This will enable decision making to occur in coordination with real-time ground observations.

24. Additional progress has been made with community organization. The PMM heard directly from future beneficiaries of the VFDM project, who were informed on the impacts of climate change and eager to expand their committees for projects outside of the VFDM scope (note Project Performance Report III for a comprehensive list of progress per indicators).



Community leaders in Tabota, Benin lead discussion with project committee and share their experiences hosting a weather station.

25. An evaluation of the environmental and ecosystem services has been completed along with general guidance to promote ecosystem services in the Volta basin. Another evaluation of all computer equipment plus network availability is being carried out along with the establishment of a centralized database framed around national structures. Computer servers are being acquired to support the database and EWS.

26. Capacity reinforcement of implementing partners dealing with flood risk management has occurred from eight national workshops. Six additional workshops were completed centered on nature-based solution training. Four national agency management courses regarding flood and drought management were completed using distance learning and one is in progress.

27. Activities planned for the end of 2022 and into 2023 include the following:

- Installation of nationally centralized databases in the six Basin countries,
- Activation of VOLTALARM (cloud-based),
- Development of hydro-weather and forecasting system models for the Basin,
- Support for policy decisions related to reinforcement and resilience at the local level, national, and cross-border,
- Capacity reinforcement of implementing partners at all levels concerning policies, strategic planning, and risk management,
- Test of VOLTALARM in ten test pilot sites to measure the applicability and efficiency of the system.

28. Regarding the NGO partners, the PMM noted that they demonstrate strong community organization skills and an ability to relate well with the weather station committees. Part of their

approach includes interacting with the local communities using an iterative process, rather than a top-down approach. Further progress-to-date is noted in the following sections:

MAIN FINDINGS AND BEST PRACTICES

Pilot program for regional projects acts as pioneer

29. The Adaption Fund Board's 2015 invitation to submit regional project and program proposals opened the door for the regional approach.[4] Specifically, the Board noted that, "Regional projects and programs in the context of the Adaptation Fund are understood to be such projects and programs that are implemented by Multilateral and Regional Implementing Entities in two or more countries in the same United Nations region, or adjacent regions, particularly countries that share a common border and/or similar adaptation challenges in the sector or sectors that the proposed project or program targets."

30. The VFDM project fits this spirit, and the original invitation and subsequent pilot program created the rationale for all current regional projects, plus a permanent funding window. Thus far, The Fund has approved US$219 million in regional project grant funding for 19 transboundary projects and programs in 35 countries.

31. The VFDM project equally seeks to achieve the goal of the original pilot program, especially related the thematic areas, which include disaster risk and reduction, early warning systems, and transboundary water management. Relatedly, the PMM used the pilot program criterion to view the progress related to the VFDM project's support to countries addressing the adverse effects of climate change and building climate resilience.

Transboundary flood and drought early warning system scheduled for 2023 launch

32. The hydrometeorological VOLTALARM early warning system will be ready for launch in early 2023. The system will be used to house and disseminate all data related to flood and drought. It is hosted by myDEWETRA, a real-time integrated system for hydro-meteorological forecasting, which acts as a single access point. VOLTALARM is cloud-based and open source. Its main purpose is to provide enough information from multiple data sources to give decision makers real-time early warning and forecasting abilities.[5]

[4] Issues Related to Regional Projects/Programmes AFB/B.25/6/Rev.2 10 April 2015, https://www.adaptation-fund.org/wp-content/uploads/2015/04/AFB.B.25.6.Rev_.2_Issues-related-to-regional-projects.pdf

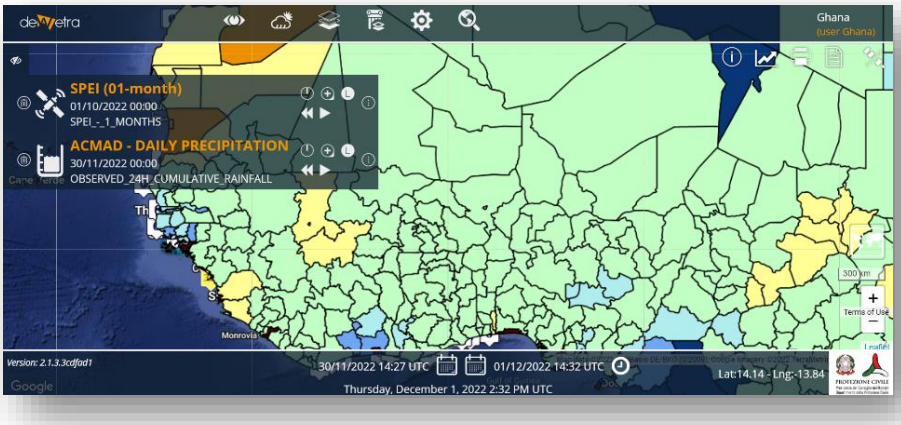
[5] myDEWETRA landing page: https://volta.mydewetra.world/

33. VOLTALARM is managed by CIMA and is designed for all key decision makers across the six VFDM project countries. CIMA presented at the National Risk Prevention and Management Strategies Workshop in Cotonou, Benin. Currently, the regions are deciding the communications protocol to link the automated weather stations hosted by communities.

myDEWETRA landing page, from where VOLTALARM data may be accessed.

34. CIMA outlined the main functions of VOLTALARM, which include (i) enhancing disaster risk knowledge, (ii) disseminating alerts related to flood and drought, (iii) detection, surveillance, analysis, and forecasting of hazards and consequences, and (iv) improving preparation and response capacity. The system does all of this by aggregating global and local data, overlaying and analyzing risk scenarios in real time, and then communicating alerts. One key advantage of the stations is their ability to forecast rain over a 72-hour period.

35. CIMA emphasized that by combining dynamic and static data, geospatial directives and global products can be combined. The system outputs the varying data into products such as simple PDF files, xml, or shp files. The combined data (much of which is gathered from weather stations) allows for dynamic forecasting as well. The PMM directly viewed VOLTALARM in a demonstration and were equally able to login and test the mapping capability. The system's capability to draw from existing, validated data will have a positive impact on the region regarding early warning and forecasting.



myDewetra produced VOLTALARM map showing daily precipitation across West Africa in real time.

36. Regarding the capacity building for VOLTALARM, community level risk maps have been produced reinforcing local technician forecasting capacity. The capacity reinforcement has stemmed from eight workshops, and flood and risk maps for the region are now available. There was also an exchange conducted between regional focal points, plus a community initiative for

the management of flood and drought in six pilot sites using online courses. Ten pilot sites will continue to be used into 2023 before the full launch.

37. Concern remains on the exact method for applying the VOLTALARM data across the region. Participants of the meetings and workshops **recommended** a more formalized and practical protocol for the access and use of VOLTALARM.

Findings related to policy and the interinstitutional coordination framework reinforce cooperation

Policy

38. Many of the findings related to policy occurred during the ministry meetings. The PMM held meetings with three ministry offices: Ministry of Water and Mines in Cotonou, Benin; Ministry of Water and Forests in Abidjan, Côte d'Ivoire; and the Water Resources Commission (under the Ministry of Sanitation and Water Resources) in Accra, Ghana (list of Director Generals and Commissioners can be found in annex III).

39. The Benin Director General of Water and Mines noted how they implement all policies related to water and mine management; this includes organizing the necessary actors and national implementing agencies. The Ministry also mobilizes resources for water activities. With the onset of climate change impacts, the Ministry equally responds to risks.

40. The Ministry noted a constraint regarding the integration of sectors, that of sensitizing the public on preventative measures related to flood and drought. To address this constraint, the Director acknowledged WMO's sensitization efforts for the public as a success, which has helped with the project implementation. Additionally, Benin weather services already work in collaboration with the other ministries and any further transboundary collaboration can be facilitated with a letter from the Ministry of Foreign Affairs.

41. The Cabinet Chief from the Côte d'Ivoire Ministry of Water and Forests echoed similar sentiments as Benin, such as the importance of an integrated approach to tackling the impacts of climate change. The Chief also noted the timeliness of the VFDM project, as every river in Côte d'Ivoire overflowed its banks this year.

42. The Chief emphasized that three ministries are coordinating via a climate change working group (Water, Environment, and Health). Following the meeting at the Ministry, the chief mentioned that he will call a meeting with the Minister to discuss the VFDM project extension and potential funding opportunities with the Adaptation Fund.

43. During the final PMM Ministry meeting at the Ghana Water Resources Commission, the water commissioner emphasized that Ghana has a four-year planning cycle and needs to further synchronize their risk and reduction plans for better policy adoption. The Commissioner also emphasized that Ghana's national planning framework has a section for emergency response and **recommended** to the other countries that this type of section is found in their frameworks.

44. The Adaptation Fund Board member based in Accra equally offered an assessment regarding climate change adaptation activities and funding for the region. She emphasized how GWP and VBA have already delivered concrete results on the ground and demonstrated a number of lessons and experiences on disaster risk reduction and early warning systems.

Meeting of partners and stakeholders at the Ghana Water Resources Commission head office in Accra.

45. The Ghana Water Commissioner highlighted how the VFDM project demonstrates countries' ability to strengthen their strategies using an integrated approach; this falls in line with the Adaptation Fund Board's original regional pilot program goal. This approach includes the sharing of risk maps, nature-based capacity development, and regional training. The achievements of the project thus far, represent the socio-economic interests of Ghana.

46. WMO showed how the VFDM project was designed to support national policy through the sharing of scientific information. The sharing of this information is culminating in the launch of the VOLTALARM EWS. Nevertheless, certain gaps remain regarding data sharing and all Ministries noted their lack of a dedicated budget to ensure data collection.

47. Participants **recommended** that the collection of data and assurance of investment durability should not be project-based but integrated into policy for the long term. The participants also **recommended** further efforts to address flood and drought management at the national level to reduce the reliance on donor-funded projects. Finally, participants **recommended** that project results be shared with the African Union (AU) and Economic Community of West African States (ECOWAS) to further strengthen regional cooperation.

Interinstitutional coordination

48. Interinstitutional coordination framework findings were mostly collected from the PMM while attending all or part of three workshops and meetings: the National Risk Prevention and Management Strategies Workshop in Cotonou, Benin; information exchange meeting with VFDM partners and PMM in Abidjan, Côte d'Ivoire; and the Project Technical Advisory Meeting in Accra, Ghana.

49. A recurring theme during the workshops and meetings was the desire for the VFDM project to be scaled up and for the disaster risk and reduction plans to be operational. Participants from each country also agreed that complementary projects should be better linked between institutions to ensure sustainability. The VBA gave their ecosystem and community projects (set up in 2009) as an example of projects that are complementary, and how they constantly apply lessons and recommendations from these projects to the VFDM project. Participants noted the

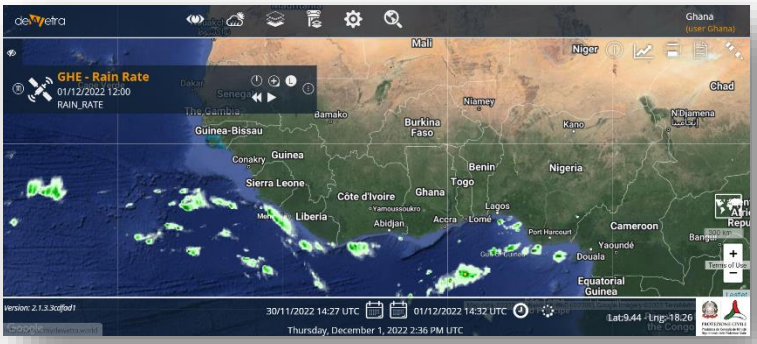
VBA's ability to organize communities to address climate change and **recommended** further synchronizing these efforts.

50. During the Abidjan meeting, very specific examples were raised to show the community organizational efforts related to the interinstitutional framework. For example, La Colombe Ivoirienne Pour le Bien-Être Social (CIBES) NGO offered an example of their color-coding efforts to warn of disasters. The community is oriented to these codes and certain focal members of the public guide the community. CIBES also highlighted the need to establish places where the displaced may go, such as schools. Most institutions in the region operate with a similar type of code.

51. A concern raised from participants in Abidjan was that agricultural extension service agents are not always included in the training and sensitization efforts. It was **recommended** to ensure the better integration of relevant national stakeholders, which remains a challenge of the project.

52. During the Benin workshop, CIMA presented on the EWS progress and their coordination efforts across the six countries. They noted how VOLTALARM is not a tool for the general public to access but remains available for national risk management actors. They emphasized that during a crisis, one cannot have too many people accessing the data, as this could risk server overload, data corruption, plus misinterpretation of data.

53. Concerning durability, once the project ends, CIMA is confident the agencies will continue to use VOLTALARM, as they are already integrating it into their national planning. There is also enough data to ensure accurate information since the stations are automated. In general, the system is meant to complement holistic regional disaster management efforts, not act as a stand-alone device. All data must be synchronized to the national plan and used as a tool to better inform partners. It was **recommended** to better inform partners on how the data is verified and how it can be included within national plans.



CIMA will continue to support the myDEWETRA platform once the VFDM project ends. This image shows current rain rates across West Africa using real-time data.

54. Regarding communication channels, several participants of the workshops and meetings expressed concern at the limited way information is shared with the community. One solution being used by several NGOs is the posting of village information boards, which are updated regularly using flood and drought forecasting information. Participants noted that the community will only support these preparedness efforts if they feel they are getting something in return. WMO plans to focus on forecast dissemination during the last stage of project implementation.

55. Regarding the durability of interinstitutional cooperation, the implementing agents of the VFDM project work with civil protection and other authorities to help change the mentality regarding environmental sustainability. For example, the Côte d'Ivoire Ministry of Environment is working on mobilizing resources to address some of the concerns raised. All agreed that successes at the regional level need to be applied to the country level; it is merely a question of funding.

56. Following further discussions with Côte d'Ivoire stakeholders, it was **recommended** that to create more value, efforts need to continue at the federal level, which may cause a protocol shift. A more defined national process is needed and if local communities establish successful practices, they need to be integrated into national policy. This would include better integration of women into the local committees.

57. At one Côte d'Ivoire site, project committee members have actively recruited 16 women to help with decision making. Despite progress on gender mainstreaming, a considerable imbalance remains at all levels. The PPR-III noted the imbalance is especially noticeable at the national level in all countries.

58. During the meeting at the Ghana Water Commission, support to the transboundary hydro-meteorological network was mentioned as a challenge. The WMO and Adaptation Fund are focused on adaptation measures already available to the community via the VFDM project, which should add value to the transboundary network. This includes the growing program of extension agent exchanges and sharing of information at the national level from the VBA and GWP.

59. Also at the Ghana Water Commission meeting, the importance of incorporating hydrological models was highlighted. Currently, several forecasting systems exist using similar types of data. These systems need some type of integration tool. WMO emphasized that the EWS dashboard can include data from these systems, and that such integration is key to achieving regional forecasting.

60. Data also remains a crucial issue for the area of the Basin inaccessible due to security concerns (Burkina Faso and Mali). Fortunately, local agents continue to gather weather station data and send it virtually. Physical assessments and direct interaction with community members remain difficult however, without ground access from agents outside the affected countries.

Addressing concerns and proposed actions

61. To address some concerns, the VFDM project has helped the VBA and GWP put together national institution activities in each country. The ensuing workshops have facilitated the sharing of approaches, and other participants at the meetings mentioned the multiple workshops have been beneficial for training and the sharing of project implementation approaches. Before the project, the relationships between national agencies needed improvement, and the VFDM has been beneficial in ensuring an improvement.

62. To help with diagnosing the current interinstitutional gaps that exist, steering committees have been founded at the national level and contain multiple sectors. In Ghana's case, the committee is organized by the Water Commission. However, data sharing remains a challenge due to a lack of policy on how data is shared. Regarding the centralized database for the EWS, it will be housed within Ghana (including the computer servers). Data gathered for the Basin also works for all parts of the Volta and community-level participation is key in acquiring this data.

63. Togo and Benin share transboundary forecasts using the Famine Early Warning Systems Network (FEWS-NET) based on data sharing. They noted the importance of ensuring the quality of the data and enabling of real-time forecasting.

64. The VBA emphasized that many local institutions remain involved with the needs assessments. Beneficiaries are also involved from the beginning and committees have several redundancies of staff. The PMM noted a commitment from these stakeholders and following the project end, these committees and institutions are expected to remain in place.

65. The transboundary EWS will also benefit from a new French-funded meteorological station in Abidjan. This station will produce more data relevant to the VFDM project and is a chance to further strengthen VOLTALARM data.

66. During the third Hybrid Project Technical Advisory Committee Workshop, the VBA reminded the participants that they strive to create a cohesive organization. Both representatives thanked the Adaptation Fund Board for their support of the project and encouraged a second phase. Full details of the advisory meetings may be found on the VFDM project website.[6]

67. During the advisory meeting, some participants raised concerns regarding technicians in Togo not being adequately trained in the use of VOLTALARM. The Togo representative requested additional training be added and WMO mentioned that the next training will include how to disseminate VOLTALARM data.

68. The meteorological representative from Ghana discussed the advantages and concerns using Ghana Meteorological Agency (GMet) modeling. He suggested Weather Research and Forecasting (WRF) modeling is more useful for hydrological scenarios and can be leveraged for flood warning. His point was used to reiterate the need to update the national framework and link it with ECOWAS water and climate services. WMO can support this modeling and use Ghana as a pilot. WMO emphasized that the VFDM project is already linked to national plans. WMO will work directly work with GMet to ensure the hydrological section is included.

69. Participants also reiterated the need to clarify the linkages between the VBA and other countries regarding data sharing protocol. Even though a data-sharing protocol exists on paper,

[6] Volta Flood and Drought Management Project Documents- https://www.floodmanagement.info/volta-basin/deliverables/

it is not clear to the implementing technicians. Participants recommended clearer protocols following data dissemination be made available to all project implementors.

Field visits in Benin and Ghana show strong community organization

Tabota, Benin

70. The PMM visited the villages of Tabota in Northern Benin and Kunkua in Northern Ghana to speak directly with the executers of the VFDM project and beneficiaries. During these visits, the PMM was able to hear first-hand how the weather stations and disaster early warning efforts were benefitting communities. Each pilot site (one in each participating country) has a weather station installed that reads rainfall levels, relative humidity, pressure, and wind speed and direction (some stations lack wind readers).

Adaptation Fund and VBA PMM members address the community in Tabota, Benin.

71. In Tabota, the surrounding region is now integrating knowledge gained from the installed weather station into their disaster risk and reduction planning. There are seven localities affected by drought in the Boukombe region and the focus remains on these areas. Flood is also a concern, but drought remains the main issue facing Tabota residents.

72. The Adaptation Fund Board secretariat, WMO, and VBA led discussions with the arrondissement chief and disaster preparedness committee president (this committee oversees hosting the weather station). The committee explained that the town was content to host the station and appreciated its value, even if much of it is not fully understood.

73. The committee president welcomed the PMM and gave an overview of how the committee was formed: The local NGO, Alpha et Oméga, organized 21 committee members initially. The committee stated that they have created a strong group based on trust. They had three key areas to highlight: (i) formation of the committee was greatly facilitated by Alpha et Oméga, (ii) administration of the committee is challenging and takes time outside of normal work or household duties, and (iii) they had some challenges with communication channels, but now have a good system in place. The committee has even expanded its scope and begun a separate vegetation planting project with 1000 seedlings, planted along the local river.

74. Several Tabota houses were marked with water level lines, indicating when a residence should be evacuated during a flood. The committee president said at first this system of marking created mistrust and malcontent, but they have since reassured residents of its benefits. Related to flooding, the president mentioned that water scarcity remains a challenge during the dry season and when it floods open defecation creates water-borne illness.

WMO meteorology and hydrology senior specialist explains to the Tabota, Benin committee and community how the weather station gathers data.

75. Several residents and a student demonstrated strong knowledge on climate change issues during the meeting but were not entirely clear on the functionality and benefits of the weather station. As a result, the WMO specialist based in Abuja, Nigeria (and PMM member) brought the committee to the station to explain about its functionality and future benefits. This action seemed to greatly reassure the committee that the station was going to add much value to forecasting abilities and ultimately, to supporting farming practices.

76. The committee is setting up its own income-generating projects. They asked for assistance setting up livelihood improvement activities and noted how the committee has become efficient and meets regularly.

Kunkua, Ghana

77. In Kunkua, the PMM noted the strong organization of the project committee, similar to Tabota. The local NGO Organization for Indigenous Initiatives and Sustainability (ORGIIS) relates well to the community and highlighted their equal partner approach to development. This was evident during a community discussion with the village heads and ORGIIS representatives, as input was received from residents about the benefits of early warning for disasters.

78. ORGIIS offers training to the local community and certifies them in certain forecasting tools. Regarding their local weather station, the committee in charge of hosting the station work with varying community groups, including religious leaders, to spread information on the station's benefits.

79. The VBA representative gave a detailed weather station overview to some residents and showed them the SIM card technology used to transmit data. The committee benefitted from this overview, and it is **recommended** to offer them to all communities hosting stations.

80. Kunkua residents also benefit from marking certain houses for floods. Their village suffers frequently from flooding, and beyond house markings, they also use a river level marker. This marker helps prevent residents from crossing when water levels are high.

81. Much of the resident's cohesion comes from WMO sponsored training delivered by ORGIIS. The ORGIIS representative emphasized that they approach the training as an exchange and first seek community insight before suggesting an activity. Their approach is livelihood driven.

82. The village chief expressed his interest in hosting the station and noted how the results will benefit other surrounding communities. A female resident expressed her appreciation of the ORGIIS training and noted how they combined first aid, risk management, and early warning training together. This helps them in a variety of ways, plus facilitates planning for the harvests. Specifically, the early warning benefits (once the station is fully operational) will help them sow and dry crops more effectively.

Flood water level markings are an important element of warning residents when they must evacuate their homes.

83. Another resident noted how the committee formation helped bring them together and the by-product is a closer-knit working group that addresses other issues. For example, the committee decided to embark on their own basket weaving business initiative and showed the PMM their products (they requested more support for these projects). They are also better informed on more sustainable planting methods, which avoid erosion.

Kunkua, Ghana committee and community members observe first-hand the GSM technology used to transmit weather data from their local station.

84. A member of the women's sub-committee mentioned the benefits of the training regarding the protection of flora and public safety. She cited examples of protecting trees and avoiding electricity cables during floods. She also talked of the baobab and shea butter efforts carried out by the village and how their training improves their sustainable production methods.

85. One concern noted was that the school is too small to host flood evacuees. They would like to create a public shelter. Additionally, the community remains extremely vulnerable to the impacts of climate change.

LESSONS LEARNED AND RECOMMENDATIONS

Lessons learned at the Adaptation Fund Secretariat Level

86. **The VFDM basin-level regional approach enables economies of scale e.g.** avoiding individual country agreements and individual program costs.

87. **Adaptive management and close coordination among stakeholders are key to address diverse situations across large areas and different socio-political contexts** e.g. the VFDM project had to adapt due to political instability in Burkina Faso and Mali.

88. **Innovations such as managing shared data through VOLTALARM relate well to the original pilot program criteria of linking web-based knowledge and management systems.** Data sharing matters are pivotal to the successful implementation of regional early warning system initiatives and should be considered as early as project design.

89. **Local civil society actors and NGOs are key to implementing activities in remote areas that are sometimes beyond the reach of national institutions**; this was viewed first-hand by the PMM in Tabota and Kunkua.

90. **System/equipment maintenance and operations commitments made during project design by relevant stakeholders are key to maximizing changes of assets beyond project's lifetime.**

91. **Dissemination of bulletins and relevant coping measures are critical for vulnerable communities to adapt to climate change.** Such measures were absent during the PMM field visits.

92. **Project result frameworks that are too elaborate, with numerous indicators, are not always useful in providing feedback to stakeholders.** This could cause a missed opportunity for results-based management.

93. **The inclusion of NIEs within regional project activities would help ensure more holistic support to the VFDM project (where applicable e.g. FIRCA in Côte d'Ivoire).**

Lessons learned at the project level

94. **The VFDM project continues to bring together regional actors, plus strengthen the regional forecast system.** The numerous training sessions and workshops laid the groundwork for interinstitutional cooperation. This is partly due to the design of the training and workshops and applicability to the region's needs.

95. **The VFDM project continues to build capacity, especially at the local level.** Even though VOLTALARM has not fully launched, vulnerabilities from the data have already been identified and mitigation measures applied from the village project committees. The flood level marking on houses is a good example of this.

96. **Local NGOs benefit strongly from the project and their own activities act as co-benefits.** This was observed at both project sites and highlighted the benefit of integrating activities. For example, the Tabota committee uses their meetings to act on other issues beyond disaster management, and the Kunkua committee has formed an entire small business of basket weaving.

97. **CIMA is a motivated agency for setting up a VOLTALARM**. Additionally, it customized the early warning system to account for issues beyond flood and drought. The system is cloud-based as well and available at no cost to users. This stems from CIMA's focus on development, not profit.

98. **The observed organization of the project committees indicates the disaster management initiatives will continue to some degree.** This is partly due to the cohesion created among the committee members.

99. **Risk maps create co-benefits as other entities share the data.** Replication of activities from project sites encourage peer to peer learning.

100. **Regionally, there are several layers of inter-government agency and local NGO interaction, and these layers of practicality will help the project endure.** For example, the two NGOs in Benin and Ghana noticeably worked well with the local and regional agencies. Further formalizing these relations would benefit the project.

101. **VOLTALARM's functionality using automated and manually created data fits well with the region's sometimes non-technical distribution of early warning information.** For example, in communities with no Internet or 4G access, bulletins can be printed and distributed. Information can also be transmitted via radio.

102. **The speed of implementation did not always match the ability of project implementors, causing delays.** These challenges may impact the VFDM project's overall progress and will need to be addressed to ensure flood and drought management efforts remain coordinated by regional actors**.** WMO needs to verify their numerous outcomes to ensure they are not creating too much expectation.

103. **There is a noticeable gap between what national authorities are doing and what the WMO is doing.** The integration of monitoring systems is lacking, and this might undermine the sustainability of the project. WMO should share their implementation models in advance and rely less on officials accessing the project website, which is quite complex.

104. **In Benin and as a result of the progress, the communities expect more help on improving their water issue – sporadic access to good sources of clean water.** The VFDM project raises expectations of the community, which is something to consider for future sensitization efforts.

105. **The VFDM project has helped the VBA and GWP put together national institution activities in each country.** The project workshops have effectively facilitated the sharing of approaches. Participants at the various meetings mentioned how the multiple workshops benefitted them regarding training and the sharing of project implementation approaches. Before the project, the relationships between national agencies needed improvement, and this has been partly addressed through the VFDM project.

106. **Regarding the sharing of project information with the AU and ECOWAS, it currently does not occur.** It was recommended to explore if a mechanism exists to better link to regional projects outside the VFDM project.

107. **The VFDM project meteorological training has been very useful in helping with inland water forecasts and as a co-benefit highlighted that marine forecast improvements were also needed.** Now, the Ghana Meteorological services issues inland water and a separate marine forecast, which is more tailor-made to fishermen. This is a direct result of the VFDM project training.

108. **Regardless of recent data collection success from VOLTALARM, data collection is not a priority of governments and there is often no budget for this.** Budgeting for data collection needs to be secured at the national level.

109. **The VBA will continue to manage the VFDM project beyond the closing date.** This will be facilitated by the no-cost EWS including its cloud-based maintenance by CIMA.

Recommendations

110. **The communities visited by the PMM would benefit from further clarification on the weather station functionality.** Even though the local communities demonstrated a strong understanding of climate change and were open to early warning concepts, they were not entirely clear on the functionality of the weather stations and resulting benefits. They would also appreciate seeing some of the VOLTALARM produced bulletins, which would help them better view the actual data and subsequent bulletins produced. This can occur even before station installations.

111. **Regional political and economic union backing may be important in successfully implementing regional adaptation activities, notably in terms of facilitating data sharing.** It is important to take into consideration any existing gaps during project reviews as well as implementation.

112. **The two project committees visited in Tabota and Kunkua have high expectations from the VFDM project and would benefit from further efforts to demonstrate the non-monetary value gained from the stations.** Such efforts can be carried out by the local NGOs with further sensitization regarding long-term benefits resulting in better disaster management.

113. **The WMO should continue efforts showing the value of collecting weather and hydrology data on the ground,** The community then sees how these efforts inform an early warning system and the importance of disaster management.

114. **Tabota, Benin project committee members asked for livelihoods improvement activities, which would go beyond the project's scope.** This highlights the importance of addressing the impacts of climate change beyond weather bulletins and the need for an integrated approach.

115. **The production of a more focused VFDM project exit plan would be beneficial.** As noted in PPR III, most outputs are slated to be measured at the end of the project, thus creating a gap between the project end and ability to note results achieved.

116. **VFDM project organizers should not assume that a workshop, meeting, or committee information session can ensure strong knowledge on how a weather station works and the benefit it offers the community.** A strong explanation and demo are recommended on site to explain exactly how the station operates, and what type of data is available. The village committees are sometimes impatient on seeing solid results.

117. **The collection of data and assurance of investment durability cannot be project-based.** It must be integrated into national policy to be successful over the long term.

118. **A more formalized and practical protocol for the access and use of VOLTALARM should be established.**

119. **Further efforts to address flood and drought management should occur at the national level to reduce the reliance on donor-funded projects.**

120. **Project results should be shared with the AU and ECOWAS to further strengthen regional cooperation.**

121. **A solid plan is needed outlining the relation between CIMA and the executing entities for the handover of the EWS.** Given the caveats observed and pending questions regarding sustainability, such an outline could be included within the aforementioned exit strategy.

WAY FORWARD

The no-cost extension for the project will benefit activities postponed due to COVID-19. WMO, GWP, and VBA will equally continue their regular schedule of technical meetings and workshops, which have proven to be effective at integrating national agencies. Most promising, the finalization and launch of VOLTALARM will help codify many of the processes needed to ensure the sharing of data is clear to all stakeholders and can be applied to early warning.

The PMM team observed significant progress of the VFDM project since the MTR. This report will help inform the Adaptation Fund Secretariat of the progress observed as well as support the executing entities to adjust where needed and strive closer to achieving the intended outcomes.

ANNEXES

ADAPTATION FUND

ANNEX I

Agenda for PMM

Portfolio monitoring mission of the Adaptation Fund Board secretariat for the Volta Flood and Drought Management (VFDM) project

Nov 20 – Dec 2, 2022

Date	Country Name	Activities	Support from VFDM project partners	Additional comments
Day 0- 20 November 2022		Arrival to Cotonou, Benin		
Day 1- 21 November 2022 09:30-12:00	Benin	Half day meeting in Cotonou (organized back-to-back with National risk prevention and management strategies workshop planned from 22- 25 November) with the honorable Minister and Designated Authority to the AF	WMO, VBA and GWP-WA to join the workshop	AF Board member in Ghana to be invited to the regional opening session. CSO representatives to be invited at opening session in each country.
Day 1- 21 November 14:00-16:00	Benin	Meeting with the Volta project partners (WMO, VBA, GWP-WA)	WMO, VBA and GWP-WA to join the workshop	To present some additional information on the project implementation
Day 2- 22 November 2022	Benin	Travel from Cotonou to Community visit in the northern district	WMO and VBA to join the travel team	
Day 3- 23 November 2022	Benin	Visit the community and meet community representatives	Adaptation Fund and WMO	
Day 3- 23 November 2022	Cotonou, Benin	Return to Cotonou and Travel to Abidjan in the evening or next morning		
Day 4 – 24 November 2022 14:00 – 17:00 pm or 25th November 2022 09:00-12:00 pm	Cote d'Ivoire	Travel to Abidjan Organize a half day meeting with Cote d'Ivoire National agencies staff with the honorable Minister and NDA to the AF	WMO, VBA and GWP-WA to join the workshop	
Day 5- 25 November 2022		Travel to Ghana		
26 – 27 November 2022- weekend- reporting days				
Day 8 – 28 November 2022	Ghana	Organize a half day meeting with Ghana National agencies staff with the honorable Minister and NDA to the AF	WMO, VBA and GWP-WA to join the workshop	

Day 9 – 29 November 2022	Ghana	Travel to Tamale and then 2 hours' drive to Bongo to reach the Kunkua community	WMO to join the travel team (VBA to support the National workshop)	
Day 10- 30 November 2022	Ghana (Kunkua)	Visit to the community and meeting with the community representatives		
Day 11- 30 November 2022	Ghana	Return to Accra via two hours road drive and flight from Tamale		
Day 12- 1 December 2022	Ghana	1 day hybrid Project Technical Advisory committee meeting	Invite PTAC members to join face to face from participating countries (Burkina Faso, Mali and Togo)	Some participants can connect virtually
Day 13- 2 December 2022 10:00-12:00 pm	Accra, Ghana	Debriefing meeting with the Adaptation Fund and WMO		
Day 13- 2 December 2022	Accra, Ghana	Evening - Travel back to respective work location		

ANNEX II

MISSION MEMBERS:

Mahamat Abakar Assouyouti – Adaptation Fund Senior Climate Change Specialist and Head of Mission

Giacomo Teruggi – WMO Scientific Officer

Ramesh Tripathi – WMO VFDM Project Officer

Michel Nikiema – WMO Meteorology and Hydrology Senior Specialist

Boukari Niampa – VBA Development Socio-economist and mission coordinator

Hugo Remaury – Adaption Fund Consultant

Marc Neilson – Adaptation Fund Consultant

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ANNEX III

PEOPLE MET:

BENIN

First Name	Last Name	Organization/Title
Philippe	Adjomayi	Benin Technical Control Water
Théophile	Djagbe	Alpha et Oméga NGO
Armand	Houanye	GWP Executive Secretary
Said	Hounkponou	Benin General Director of Water
Bernard	Kointatcha	Boukombe, Arrondissement Chief
Meanta	Kombeti	Boukombe, Benin Town Hall
Innoussa	Koubouagou	First Organizer of the Tabota Disaster Mgt Committee
Emmanuel	Lawire	Cabinet Director Ministry of Water and Mines
Anna	Mapelli	Researcher Hydrology and Hydraulics
Dr. Dibi	Millogo	VBA Deputy Executive Director of Operations
Armel	Sengo	President of Tabota Disaster Mgt Committee
Giacomo	Teruggi	WMO Secretariat Head of Technical Support Team/Flood Mgt
Joname	Zabre	Benin Chief of Technical Facilities/Water
56 Tabota committee and village participants		

CÔTE D'IVOIRE

First Name	Last Name	Organization/Title
Koffi	Antoine	Deputry Director Côte d'Ivoire Ministry of Water and Forests
Robert	Dessouassi	VBA Executive Director
Dr Jean-Marie	Kouakou	Assistant Director of Evaluations Côte d'Ivoire Ministry of Water and Forests
Auguste	Kouassi	Director of Structures DPARE
Jean-Michel	Onebrou	Ministry of Water and Mines
Tra-bi	Rodriguez	DPARE
Firmin	Yaokonassi	DPARE

GHANA

First Name	Last Name	Organization/Title
Brainmah	Abu	GMET Bolgatanga
Joachim	Abungba	Basin Head

Dorcas	Adwoa Paintsil	Acting Executive Secretary Water Resources Commission
Kenneth	Amoatrey	Director Abibi Nsyrma
Godried	Asamoch	Water Resources Commission Project Officer
Solomon	Asampana	District Head Kunkua
Eric	Asuman	GMET
Maxwell	Boateng	Ghana GWP Executive Secretary
Patience	Damptey	Adaptation Fund Board Member
Celestina	Deku	LUSPIA Senior Program Officer
Jesse	Kazapoe	Water Resources Commission Basin Head
Lilian	Koranteng	GIDA Project Officer
Asante	Kwaku	Hydrologist
Benjamin	Lamptey	GMET
Frederick	Logah	CSIR
Marco	Massabo	CIMA
Gyimah	Mohammed	Head of Climate Change MESTI
Eric	Muala	Water Resource Commission
Julius	Ngu	ORGIIS NGO
Charlotte	Norman	NADMO
Emmanuel	Oboubie	CSIR
Selkina	Okornoe	Ministry of Sanitation and Water Resources
Jean-Marie	Ouya	VBA CFO
Roberta	Rudari	CIMA
Eugene	Sarpong	Planning Analyst HDPC
Danko	Sylvester	HSD Hydrologist
36 Kunkua committee and village participants		

Project Technical Advisory Committee Members Met

Country	**First Name**	**Last Name**	**Organization/Title**
Benin	Boris	Polynice	National Meteorological Agency
Benin	Martial	Kuassi	
Burkina Faso	Joel	Zoungrana	Meteorological Agency Director ANAM
Burkina Faso	Gérard	Zongo	Director of Water and Information Studies
Côte d'Ivoire	Ahmed	Lamine	Director of Evaluation and Heritage
Côte d'Ivoire	Prof Koffi	Fernand	Water Resources
Ghana	Eric	Assuman	GMET
Ghana	Eric	Moula	Hydrological Service Department
Mali	Djibrila	Maiga	Meteorology

Mali	Drissa	Samake	Water Resources
Togo	Latifou	Issaou	General Director Meteorology
Togo	Kpadja	Agouda	Water Resources
sub-regional organization	Seyni	Salack	WASCAL
sub-regional organization	Janvier	Bazoum	CCRE/CEDEAO
sub-regional organization	Agali	Hassane	Agronomist CILSS

ADAPTATION FUND

ANNEX IV

Sample diagram from Benin showing the working relationships between institutions involved with communication and early warning dissemination during natural disasters.

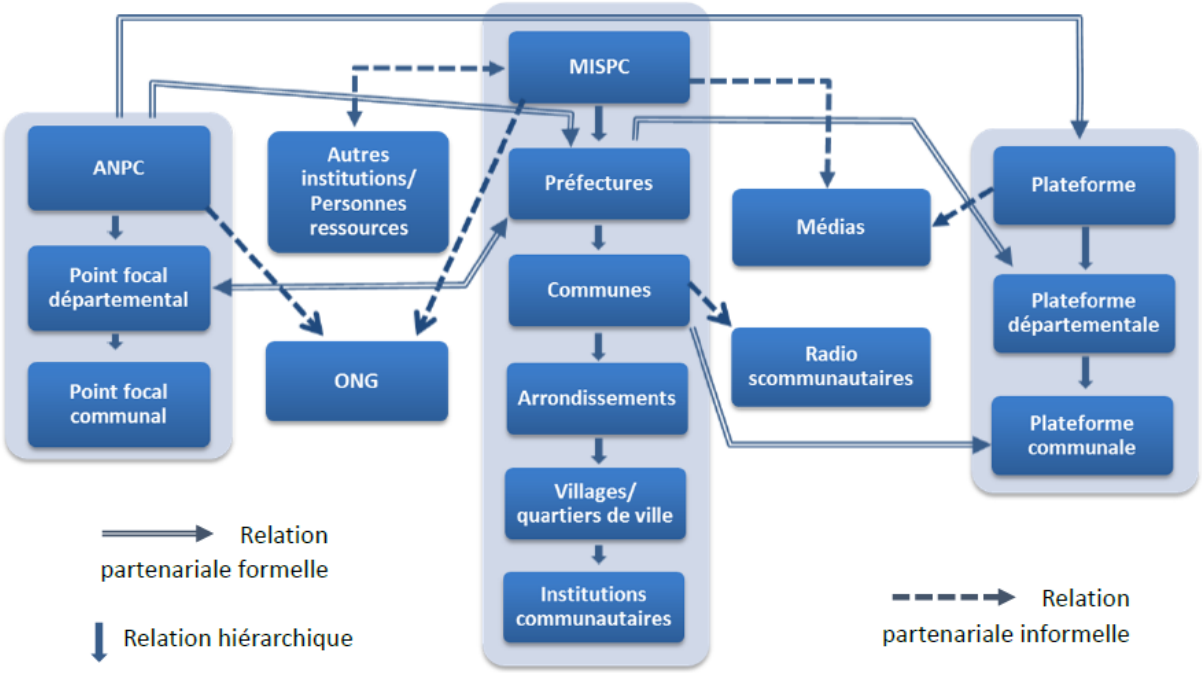

Figure 22 Diagramme des relations de fonctionnement entre les institutions composant les différents niveaux du MON