AFB/PPRC.6/11
August 31, 2011

Adaptation Fund Board
Project and Programme Review Committee
Sixth Meeting
Bonn, September 14, 2011

PROPOSAL FOR MAURITANIA - WMO

I. Background

1. The Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, adopted by the Adaptation Fund Board, state in paragraph 41 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the approval by the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would finally require Board's approval.

2. The Templates Approved by the Adaptation Fund Board (Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, Annex 3) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

> *For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.*

3. The first four criteria mentioned above are:
   1. Country Eligibility,
   2. Project Eligibility,
   3. Resource Availability, and
   4. Eligibility of NIE/MIE.

4. The fifth criterion, applied when reviewing a fully-developed project document, is:
   5. Implementation Arrangements.

5. According to the Adaptation Fund Board Decision B.12/10, a project or programme proposal needs to be received by the secretariat no less than nine weeks before a Board meeting, in order to be considered by the Board in that meeting.

6. The following project concept titled "Building Resilience to Climate Change in Coastal West Africa – Coastal Weather and Climate Hazard Early Warning System (SWCHEWS) for Mauritania" was submitted for Mauritania by the World Meteorological Organization (WMO), which is a Multilateral Implementing Entity of the Adaptation Fund. This is the first submission of the concept. It was received by the secretariat in time to be considered at the 15th Adaptation Fund Board meeting. The secretariat carried out a technical review of the project proposal, assigned it the diary number MTN/MIE/Coastal/2011/1 and filled in a review sheet.

7. In accordance with a request to the secretariat made by the Adaptation Fund Board in its 10th meeting, the secretariat shared this review sheet with WMO, and offered it the opportunity of providing responses before the review sheet was sent to the Project and Programme Committee of the Adaptation Fund.

8. The secretariat is submitting to the Project and Programme Review Committee the summary of the project, prepared by the secretariat, in the following section. The secretariat is also submitting to the Committee the technical review sheet and the responses provided by WMO, in an addendum to this document.

Project Summary

Mauritania – Building Resilience to Climate Change in Coastal West Africa – Coastal Weather and Climate Hazard Early Warning System (SWCHEWS) for Mauritania
Implementing Entity: *WMO*

Project/Programme Execution Cost: USD 345,000
Total Project/Programme Cost: 3,845,000
Implementing Fee: USD 326,825
Financing Requested: USD 4,171,825

Project/Programme Background and Context:

The main focus of the project is to strengthen the existing climate change information and Early Warning System (EWS), through the upgrading of the hydrological and meteorological data collecting stations and equipment, complemented by human resource capacity strengthening so that quality data and information collected would be appropriately analyzed, interpreted and transformed into meaningful weather forecasts and early warning messages capable of sensitizing targeted end users to take appropriate adaptation. The effectiveness of such messages (and ways to improve them) will be evaluated through pilot studies that will be carried out in particularly vulnerable areas of the country - the coastal communities in and around Nouakchott. The outputs will be used to improve the messages and their delivery mechanisms.

Activities therefore will include: (i) carry out institutional strengthening of the NMHS, improve institutional and human resources capacity; (ii) enhance service delivery for weather and climate services, in particular, through targeted engagement of end users; (iii) improve hydro-meteorological observation networks to provide timely extreme and hazardous weather warnings, including flood and storm surge warnings.

This project builds on two years or preliminary investigative work undertaken with the financial support of Government of Spain to look at the needs and components of an early warning system to support reduction of loss of life and property related to weather and climate events in coastal West Africa.

Improved efficiency and quality in weather forecasting will reduce economic risks and support investment, mitigating natural disaster and environmental risks. Improved forecasting will mitigate risks from floods, drought, winds and extreme weather conditions and will support emergency preparedness for these events. However, for this to happen, more cooperation is needed between the NMHS and agencies responsible for disaster risk management. Through this project and other efforts, support for connecting NMHS to early warning systems will be provided. Otherwise, there is a danger that the benefits of strengthening NMHS capacity through this Project will not be fully achieved.

Component A: Institutional and Technical Capacity Development of the Meteorological Service of Mauritania (USD 1,000,000)

The component will help strengthen the NMHS to ensure that it has the institutional and technical capability to sustainably observe, forecast and deliver weather, water and climate services that meet the country's identified economic and societal needs.

Outputs include:

- Established Early Warning System

- Improved NMHS capacity in strategic and technical planning
- Enhanced strategic approach to client service within the ONM
- Improved Technical capacity of ONM
- Increased exposure and recognition of the ONM within national government enabling them to affect national policies concerning weather and climate.

Component B: Improving the provision of Weather and Climate Services and Early Warnings for Severe Weather and Climate Events and related hazards (floods and storm surge) by the NMHS. (USD 1,000,000)

This component will ensure that each agency has a sound understanding of the needs of their constituency for weather and climate information and that they have a comparable level of expertise in the production of information and delivery of hydro-meteorological services.

Outputs include:
- Defined suite of weather and climate products and services based on sector specific requirements
- Developed suite of sustainable user-defined products and services specifically for: Weather hazards and sea safety, Flood risks, Climate variability, Coastal Inundation
- Increased use of appropriate and effective channels of communication to deliver services to communities

Component C: Improving Hydro-meteorological Observation Networks and related IT infrastructure for weather and Climate Data Management and Integration (USD 1,500,000)

The component will help strengthen hydro-meteorological observation systems to ensure that regional and national infrastructure is adequate to support observation, forecast and delivery of weather, water and climate services that meet the country's identified economic and societal needs.

Outputs include:
- Strengthened observation network at the national level
- Improved NMHS capacity to manage and maintain observation networks
- Strengthened IT infrastructure to enable the delivery of products and services
- Established Virtual Private Network to facilitate the exchange of weather information both within and amongst participating countries

REQUEST FOR PROJECT/PROGRAMME FUNDING FROM ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. **The final project/programme document resulting from the appraisal process should be attached to this request for funding.**

Complete documentation should be sent to

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN G6-602
Washington, DC. 20433
U.S.A
Fax: +1 (202) 522-3240/5
Email: secretariat@adaptation-fund.org

ADAPTATION FUND

DATE OF RECEIPT:
ADAPTATION FUND PROJECT ID:
(For Adaptation Fund Board Secretariat Use Only)

PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:	REGULAR PROJECT
COUNTRY/IES:	**MAURITANIA**
TITLE OF PROJECT/PROGRAMME:	**BUILDING RESILIENCE TO CLIMATE CHANGE IN COASTAL WEST AFRICA – COASTAL WEATHER AND CLIMATE HAZARD EARLY WARNING SYSTEM (CWCHEWS) FOR MAURITANIA**
TYPE OF IMPLEMENTING ENTITY:	**MULTILATERAL IMPLEMENTING ENTITY**
IMPLEMENTING ENTITY:	**WORLD METEOROLOGICAL ORGANIZATION**
EXECUTING ENTITY/IES:	**SERVICE DE METEOROLOGIE, MAURITANIA**

AMOUNT OF FINANCING REQUESTED: (IN U.S DOLLARS EQUIVALENT): **4,171,825 USD**

PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

Regional Context – Weather and Climate Hazards

West Africa is one of the most vulnerable regions to climate change and climate variability[1]. Over the last thirty years, the region has been witness to disastrous impacts of extreme weather phenomenon ranging from droughts, health related epidemics, temperature extremes, floods and storms. If appropriate adaptation measures are not taken, it is estimated that by 2030[2], West Africa will be acutely vulnerable to climate change, severely impacting health, habitat and economies. Therefore, it is necessary to enhance the region's preparedness level to mitigate the impacts of current climate variability and predicted future impacts as well as associated extreme hazard events.

The threat to coastal regions, such as those in West Africa, from rising sea levels is well documented. However, it is not necessarily changes to mean sea level that threatens vulnerable communities most in the near and intermediate time scales, such as subsistence and small-scale commercial fishers, but rather the intensity of individual storms and the associated impact on the maritime community. In particular, storm surge inundation and riverine flooding can impact on vulnerable communities and coastal infrastructure, all resulting in significant loss of life, property and livelihoods.

According to 4th IPCC assessment, global warming would be more intense in Africa than anywhere in the world. The report estimates the average temperature rise, between 1980/99 and 2080/99, for the entire continent between 3 and 4℃, 1.5 times greater than the global average. Furthermore, it indicates that climate changes in the West African region are likely to increase the frequency and intensity of floods and droughts. There is strong consensus on the fact that extremely hot seasons will become more frequent. As a result of this, and the more general warming trend, it is likely that there will be a general increase in the likelihood and intensity of high-rainfall events. This means that strengthened warnings of flooding events and storms likely to threaten lives at sea will become increasingly important component of the countries' adaptation strategies.

West African coastal countries have a high density of their population in coastal cities (40 % of West African population) where the major industries and economic activities are concentrated (e.g. fishing and fisheries, oil drilling, harbours, tourism, etc.). Additionally, a large number of economically productive people within these communities rely on fishing or benefit from the rich biodiversity associated to the various ecosystems (e.g. marshy areas and mangrove within estuaries, deltas, etc.) for their subsistence. Marine livestock consumed in West African countries are for the most part captured by the traditional fishing communities using small-scale boats highly vulnerable to meteorological hazards. Since 1980, marine related accidents have affected an approximate 1.4 million people[3] in coastal West African countries (The Gambia, Mauritania, Senegal and Cape Verde). These events contribute greatly to the perpetuation of the poverty these communities continue to face despite technological advances achieved in the science of meteorology, forecasting and related information products and services. In a changing climate, both the frequency and intensity of the storms will increase, making the requirement for an effective early warning system increasingly essential.

Severe Weather

[1] IPCC 4th Assessment Report (http://www.ipcc.ch/pdf/assessment-report/ar4/wg2/ar4-wg2-chapter9.pdf)
[2] Climate Vulnerability Monitor 2010, The State of the Climate Crisis, DARA
[3] EM-DAT: The OFDA/CRED International Disaster Database

The West African Monsoon system is an important large scale weather circulation pattern which brings rainfall to the region. It develops from April to October with the rainfall maxima at its northern most location in August. The amounts and extent of rainfall brought by the West African Monsoon varies from year to year and is known to be linked to various aspects of regional and global sea surface temperature anomaly patterns which give rise to extreme weather events. These systems that have their genesis off the West African coast can have a dramatic effect on transport and fishing activities in West African coastal waters. Additionally, they can develop into cyclonic systems in the Caribbean Sea and the Gulf of Mexico[4] as they build up and move into and cross the Atlantic.

Storm Surge

Storm surges and wind-induced waves associated with severe cyclones, and their combined effect with river flooding, leading to coastal inundation, stand out as natural hazard with extreme impact potential including significant loss of lives and livelihoods. Despite the vulnerability of the West African coastal waters and land in terms of meteorological / oceanographic hazards, forecasts and warnings for the marine and coastal area are still on infancy stages or non-existent. Recognizing the extreme vulnerability of coastal areas to storm surges and related coastal inundation, there is a strong need for the development and implementation of forecasting and early warning systems, which allow dedicated disaster prevention agencies to safeguard lives and mitigate damages on infrastructure in coastal areas.

Flooding

Heavy rainfall events in the last two decades have lead to wide-scale flooding in the region. The flooding events have direct effect in destroying infrastructure and causing loss of life and property but also indirect effects on health (e.g. triggering water borne diseases such as cholera, favouring malaria vectors development), population displacement and associated negative effects. Flooding causes widespread damage to infrastructures, loss of human life and property, as well as spread fatal communicable diseases, all resulting in major economic losses and aggravating the situation of the already marginalized communities.

The West African floods that began in June 2009 were a consequence of exceptionally heavy seasonal rainfall. Several rivers in the region broke their banks, destroying houses, bridges, roads and crops. The floods were reported to have affected approximately 770,000 people in the entire region, killing nearly 200 people[5]. In some cities, the amount of rain that fell in one day equated to 25% of normal annual rainfall for the whole country[6]. The Monsoon season in 2010 again caused wide scale flooding across the region. This situation will be exacerbated by Climate Change

Mauritania – National Context

Mauritania is highly vulnerable to extreme climate events such as severe storms, high temperatures, rising sea-levels and irregular rainfall patterns that are sometimes inadequate leading to droughts, and at other times excessive leading to flooding and inundation. The amount of precipitation is extremely sensitive to the variation in the north-south latitudinal

[4] Landsea and Gray, 1992; Bell and Chelliah, 2006

[5] http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/countries/west_africa/template/fs_sr/west_africa_fs01_092809.pdf

[6] http://www.mopea.gov.lr/press.php?news_id=80

movement of the Inter-tropical Convergence Zone (ITCZ)[7] from one year to another, causing large inter-annual and inter-decadal variations.

In recent years, incidents of disaster caused by heavy thunderstorm and gale winds are occurring in the early months of rainy seasons. Each year, heavy rains and gale force winds wreak havoc in different districts around the country by destroying houses, schools and other community-based infrastructure. As on most parts of the globe, most natural disasters in Mauritania are related to hydro-meteorological phenomena.

Climate change projections for Mauritania include:

- An increase in mean annual temperature of 3 to 4.5℃ by 2075
- A variable rainfall pattern going from -59% to +29% of a baseline of average 878mm/yr by 2100
- A sea level rise of 0.2m by 2100 (baseline scenario)
- Increased frequencies of climatic hazards such as flooding and droughts.

Climate change will thus have significant negative impacts on various sectors of the economy.

It is clear that these and other negative impacts on the economic sectors will affect the overall economic growth and development plans of Mauritania, as well as its ability to meet the Millennium Development Goals. Despite some passive attempts to adapt to these climate hazards, the capacity to address climate change impacts in Mauritania is still limited. The national and local administration have limited systematic knowledge of climate change risks, adaptation needs and options, and individual, institutional and systemic capacities to act on such risks remain low.

Mauritania

Capital	Nouakchott
Area	1,030,700 km2 (including ocean)
Coast line	754 km
Population	3,281,634
Population Growth Rate	2.349%
Life Expectancy at birth	58.9 (male) / 63.4 (female)
Urbanization	41% of the total population is in urban area, 2.9% annual rate of change
GDP per capita	USD 2,100 (PPP)
GDP - by sector	Agriculture: 12.5%; Industry: 46%; Services: 40.7%
Main exports	iron ore, fish and fish products, gold, copper, petroleum
Climate	desert; constantly hot, dry, dusty
Land use	arable land: 0.2%; permanent crops: 0.01%; other: 99.79%
Natural hazards	hot, dry, dust/sand-laden sirocco wind blows

[7] The location of the ITCZ varies throughout the year and while it remains near the equator, the ITCZ over land ventures farther north or south than the ITCZ over the oceans due to the variation in land temperatures. The location of the ITCZ can vary as much as 40° to 45° of latitude north or south of the equator based on the pattern of land and ocean. In Africa, the ITCZ is located just south of the Sahel at about 10°, dumping rain on the region to the south of the desert.

"NOUAKCHOTT, Aug 29, 2009 (AFP) – a child was killed and more than 3,500 people were left homeless when heavy rains caused houses to collapse in southwestern Mauritania, state media reported on Saturday. The child, whose age was not given, died when a house collapsed in the village of Rgheiwatt due to the rains that hit the region over the course of the last two days, according to the Mauritanian News Agency. Some 3,500 people were homeless after their houses collapsed on the outskirts of the nearby city of Rosso and have been relocated, the report said. A number of neighbourhoods around the capital Nouakchott have also been affected by the flooding."

Flooding problems in Mauritania affect a substantial part of the country territory, and are in particular concentrated in a band stretching E-W in the southern part, from the Senegal river and the border with Mali to roughly 18°N and extend northwards on the W to the cities of Akjoujt and Atar (20°30'N).

The following areas have been identified as subject to flood risk and requiring priority action: Rosso, Leqceïba, Aleg, Boghé, Mbagne, Kaédi, Maghama, Selibabi, Magta Lahjar, Tintâne, Arr, N'beïka, Atar, Akjoujt, Mbout, Aéré Mbar, Senou and Boussoubé. However, to date most of the intervention aimed at minimizing flood risk are levees and dams, concentrated in the lower reach of the river around towns. An Integrated Flood Management (IFM) approach is clearly needed. The management of floods as problems in isolation almost necessarily results in a piecemeal, localized approach. Integrated Flood Management calls for a paradigm shift from the traditional fragmented approach, and encourages the efficient use of the resources of the river basin as a whole, employing strategies to maintain or augment the productivity of floodplains, while at the same time providing protective measures against the losses due to flooding.

Table 1: Impacts of the 2009 and 2010 floods in Mauritania
(Sources: USAID, OCHA and IFRC)

Flood Year	Flood Impacts	Financial Assistance (USD)
2009	3,000 persons were left homeless in the city of Rosso and an estimated 10,000 people were displaced, representing more than 2000 families	2,155,000[8]
2010	In the areas assessed by the Mauritanian Red Crescent, 1,750 families (8,750 people) were affected. Collapse of houses displaced 1,000 families. 1,076 houses were completely destroyed and 20 commercial shops flooded	149,055[9]

Rising sea levels due to climate change are anticipated to also exacerbate the risk of flooding of the lowlands in the region of Nouakchott. This will cause major impacts on the coastal region of Nouakchott, which houses more than 25% of the national population and much of the country's industry (fish processing, tourism, construction, etc.).

A climate change information, monitoring and efficient early warning systems to inform a functional policy response system in the face of the current and expected climate change is

[8] USAID/OFDA Humanitarian Assistance to Mauritania for floods was 55,129 USD and Central Emergency Respond Fund (CERF) was 2.1M USD
[9] International Federation of Red Cross and Red Crescent (IFRC) Disaster Relief Emergency Fund (DREF) Operation number: MDRM0003

needed in Mauritania. The provision of science based advice, information and knowledge in the form of seasonal rainfall forecasting and early warning would be an important tool that will guide proper actions to be taken in response to climate hazards.

The establishment of a monitoring system, monitoring and forecasting of sea state and its interactions with the atmosphere, serve as basis for generating s for extreme marine incursions. It will also ensure the safety of persons and property and planning development in areas at risk of flooding. In addition this system will contribute to a better assessment of the vulnerability of the area and reduce the impacts of climate change on socio-economic activities.

The infrastructure networks to collect hydro-meteorological data and the capacity to analyze it and provide adequate services to the public and decision makers are extremely limited. This situation is unsustainable and more is needed to help the country "catch up" with their neighbours and to contribute to the pool of useful information that can serve the common purposes of the countries in the region. This will be achieved by investments in numerical forecasting capacity, basic observational infrastructure, communication and IT technologies, and recruitment and training for a modernized workforce.

The solution

The vulnerability of the coastal area to climate change and variability is receiving relatively significant attention in recent years, in the region, from a range of stakeholders (e.g. government, local authorities, non governmental organizations, coastal and scientific communities, etc). While there are many initiatives in terms of marine environment conservation and protection (*i.e. coastal erosion and vulnerability assessment and protection*), sub-regional or national initiatives related to monitoring geophysical parameters in marine and coastal environment (*i.e. wind, waves and swells, sea level, currents*), initiatives for generating related hazards warnings are somewhat non-existent. Furthermore, for historical reasons, more focus was given in West Africa in developing meteorological services for aviation and later for agriculture and water resources management owing to severe droughts in West Africa during the 70's and 80's. As a result, in West Africa coastal waters, there are very few observing systems for marine and coastal applications, making it difficult for national meteorological services to fulfil their mandate.

[CR 1 - R] ***Elaborate on the "concrete" components of this project in terms of how this project goes beyond business as usual capacity building.***

For Mauritania and other countries in this and other developing regions, sustainable Climate and Weather Early Warning Systems are among the ***most cost-efficient and effective concrete interventions to support climate change adaptation***. Establishing tailored weather and climate services and most especially sustainable Early Warning Services will reduce communities' vulnerability and increase their adaptive capacity to climate variability and change. The proposed project is therefore a "no regrets" intervention which will reduce mortality rates, as well as minimize the economic and social impacts of today's climate variability and therefore enhance the resilience and adaptive capacity of participating countries to climate change. This view is supported by the recent financing for a similar Weather and Climate Early Warning System in neighbouring Gambia under the GEF LDCF.

The proposed activity is not a "one-off" intervention that will initiate a new set of interventions or small scale pilots that will only last for the life of the project. Rather this project will leave a lasting legacy as it builds on systems already in place, albeit currently deficient ones. Deficiencies in the Hydro-meteorological observing net work will be addressed by i) design of an optimal network to meet the data needs for severe weather forecasting and alerts in coastal

areas and flooding in densely populated and economically important areas (during the full proposal development phase; ii) improving the human capacity of the National Meteorological Service and Hydrological Service to maintain the system and better utilise the expanded weather and climate data sets that will be available to them; and iii) an improved system of targeted information service delivery to other government ministries, economic sectors and the generally community will be put in place. The project will therefore build on foundations already in place for concrete and durable outcomes.

Strengthening the availability and quality of hazardous weather (and related events) and climate change information will support development and implementation of appropriate strategies for vulnerable agricultural communities, coastal areas and ecosystems and urban areas. Shorter-range warnings will enable disaster responders and individuals to minimise the loss of lives due to extreme weather and related events.

Sustainability lies in improving national observation systems and continuing to assess the means by which scientific knowledge and advanced technological products (e.g., early warning systems, seasonal forecasts) continually emerging could be used to enhance the resilience of vulnerable communities in developing regions such as West Africa in order to improve their capacity to cope with current and future climate variability and change and related hazards.

According to the UK Department for International Development, the lack of observational weather and climate data, particularly in Africa, is recognized as a constraint to understanding current and future climate variability. To address this evident gap, coordinated efforts of capacity building, training, research and development should be emphasized to provide for continent-wide monitoring. This will make available reliable weather and climate observations that can then be transformed into useful products for a wide spectrum of stakeholders, including policy makers and contribute to the assessment of the impacts of climate change and help improve national economic development.

Specifically for Mauritania, its observing network consist of only 13 synoptic stations and a few hundred rainfall stations. Of the 13 stations, 2 are considered principal stations (Nouakchott and NDB), while the rest only report 18h instead of 24h. Climate stations are mostly closed due to lack of meteorological instruments. The upper-air observations have not been in operation since 1993 due to lack of maintenance and spare parts. The main reasons for these inadequacies are:

- Lack of human resources (less than three observers per station)
- Lack of measuring instruments (no station is able to cover the activity of observation)
- Insufficient resources allocated to meteorological activities (management of overtime and night hours).
- Very high average age of workers (one fourth of the staff are retired);
- Lack of motivation of staff

These observation systems, land and marine based are fundamental for monitoring weather hazards originating from the continent for estimating winds at the coast and for improving numerical models to enable the Meteorological Service of Mauritania to issue accurate forecasts and warnings to vulnerable communities and save lives and livelihoods. Furthermore, a robust monitoring system is also key to improving climate models and helps in the development of more accurate decadal prediction, necessary for informed decision making at national, regional and global levels.

Forecasting storms

Forecasting a storm`s strength and speed including its possible direction is possible but not simple. Storms are essentially thermally induced, mesoscale features, they exhibit destructive nature of hailstones, violent winds and high intense rainfall but which in most cases last for a short duration (10 to 30 minutes) at most. A forecaster needs to understand the potential for supercell formation and development, skills to predict the potential of its occurrence.

Forecasting floods

Forecasting of floods is challenging. Most of floods in Mauritania are due to mesoscale systems which require ingenuity and experience of an accomplished forecaster. Such convective systems are associated with high precipitation and the forecaster needs to be able to estimate the duration of this rain, the specific location, its intensity and whether it is associated with some super cells that are likely to continually develop in motion with the precipitation. Weather radar would be the best tool to use for this. Hydrologists could also have modelling tools tailored to this kind of forecasting but, there is a need for better collaboration between the forecasters of MS and the Hydrological Service.¨

Early Warning Systems

Warning systems in Mauritania are managed by different authorities. Warning systems relating to the outbreak of epidemics are, for example, with the Ministry of Health whilst warnings systems related to conflicts are with police, army and local government. Warning systems related to geological hazards are also fragmented. In the past, meteorological warnings have been solely the responsibility of the met service and their impact has been minimised by lack of coordination with the relevant authorities needed to communicate and take action in response to the warning.

An Early Warning System should therefore be managed in a coordinated way to increase its efficiency and effectiveness, with the direct involvement of the community involved. The community to whom the service is designed should actively be involved, they must be educated, and be made aware of the risks associated with anticipated hazards. Stakeholders including policy makers should always be in state of preparedness.

The 4 elements that are central to the establishment of an EWS are:

1. Understanding the risks/hazards; including mapping hazard prone areas
2. Forecasting the risks;
3. Communicating the risks; and
4. Taking action to reduce the impact of the risks.

Many different stakeholders will be involved at each of these stages and it is therefore essential that a national EWS is not seen to be the sole responsibility of any one institution in the country. In order to be effective, all stakeholders must integrate their activity and share responsibility for its establishment. A key objective of our proposed approach is therefore to bring together all the stakeholders of an EWS in Mauritania to establish a network and to secure their commitment to sharing knowledge, working together and sharing ownership for the system.

We also feel that currently, there is not sufficient understanding of where severe weather has the most impact (flashpoints), or what action can be taken to avoid this. We have therefore

recommended a widespread consultation and detailed scoping study takes place before an EWS strategy is developed.

On the delivery side, warning services, such as they are often stay at administrative level, e.g. warnings are only sent to governmental institutions in charge of disaster management and sea safety through administrative channels. General forecasts, typically valid for 24 hours are issued on a daily basis and delivered to the public through classic media (TV, radio, newspaper) but these forecasts are not specific enough to meet the needs of vulnerable communities.

The focus of this proposal is on EWS for severe weather events and related hazards. Whilst the forecasting of other natural/biological/social hazards will be different, the communication and response strategies to warnings of these would be the same and these elements of the proposal could therefore be used to support development of a multi-hazard approach.

The Meteorological Service of Mauritania (L`Office National Meteorologie (ONM)) has the national mandate to monitor weather and upper-ocean parameters and deliver forecasts to protect lives, natural systems and properties as well as to contribute to the effectiveness of economic activities sensitive to weather and climate. However, in order for it to fulfil its mandate, the national observation system must be overhauled, its personnel must be trained and the infrastructure needed to deliver the information to the communities they serve must be upgraded.

PROJECT / PROGRAMME OBJECTIVES:

The ***overall purpose*** is to reduce the vulnerability and increase the resilience and adaptive capacity of coastal communities in Mauritania to the impacts of climate change and climate variability through the establishment of sustainable Weather and Climate Services and Early Warning System for extreme weather and climate hazards.

The ***overarching goal*** of this project is therefore: To adapt national development in the face of climate variability and change.

The ***project objective*** is to enhance adaptive capacity and reduce vulnerability to climate change through a strengthened early warning and information sharing mechanism for a better informed decision making by government and affected population.

This objective will be addressed through the realization of the following outcomes:

- Enhanced capacity of hydro-meteorological services and networks for predicting weather and climate events and risk factor
- More effective, efficient and targeted delivery of climate information including early warnings
- Improved and timely preparedness and responses of various stakeholders to forecast weather and climate linked risks and vulnerabilities
- Enhanced Weather and Climate Observation Networks

The project will contribute to climate change adaptation attempts in Mauritania by:

i) Developing capacity of the National Meteorological and Hydrological Services for packaging and sharing weather forecasts and early warning messages in ways that capture the interest and attention of specific and targeted stakeholders.

ii) Ensuring that relevant national policy instruments on agriculture; water resources, the coastal zone and the environment adequately factor in climate change issues, strengthened with legal provisions to facilitate their enforcement.

iii) Rehabilitating hydro-meteorological stations through the repair and/or installation of a critical minimal set of equipment and instruments, and the development of human resources capacities required for using them and interpreting collected and processed data. This response will improve national capacity to accurately monitor normal weather and hazards, and forecast events

The main focus of the project is to strengthen the existing climate change information and Early Warning System (EWS), through the upgrading of the hydrological and meteorological data collecting stations and equipment, complemented by human resource capacity strengthening so that quality data and information collected would be appropriately analysed, interpreted and transformed into meaningful weather forecasts and early warning messages capable of sensitizing targeted end users to take appropriate adaptation. The effectiveness of such messages (and ways to improve them) will be evaluated through pilot studies that will be carried out in particularly vulnerable areas of the country - the coastal communities in and around Nouakchott. The outputs will be used to improve the messages and their delivery mechanisms.

Activities therefore will include: (i) carry out institutional strengthening of the NMHS, improve institutional and human resources capacity; (ii) enhance service delivery for weather and climate services, in particular, through targeted engagement of end users; (iii) improve hydro-meteorological observation networks to provide timely extreme and hazardous weather warnings, including flood and storm surge warnings.

This project builds on two years or preliminary investigative work undertaken with the financial support of Government of Spain to look at the needs and components of an early warning system to support reduction of loss of life and property related to weather and climate events in coastal West Africa.

Improved efficiency and quality in weather forecasting will reduce economic risks and support investment, mitigating natural disaster and environmental risks. Improved forecasting will mitigate risks from floods, drought, winds and extreme weather conditions and will support emergency preparedness for these events. However, for this to happen, more cooperation is needed between the NMHSs and agencies responsible for disaster risk management. Through this project and other efforts, support for connecting NMHSs to early warning systems will be provided. Otherwise, there is a danger that the benefits of strengthening NMHS capacity through this Project will not be fully achieved.

PROJECT / PROGRAMME COMPONENTS AND FINANCING:

Project Components

Component A: Institutional and Technical Capacity Development of the Meteorological Service of Mauritania. The component will help strengthen the NMHS to ensure that it has the institutional and technical capability to sustainably observe, forecast and deliver weather, water and climate services that meet the country's identified economic and societal needs.

Component B: Improving the provision of Weather and Climate Services and Early Warnings for Severe Weather and Climate Events and related hazards (floods and storm

surge) by the NMHS. This component will ensure that the NMHS has a sound understanding of the needs of their constituency for weather and climate information and that they have a comparable level of expertise in the production of weather and climate information and delivery of appropriate services to relevant economic sectors and communities.

Component C: Improving Hydro-meteorological Observation Networks and related IT infrastructure for weather and Climate Data Management and Integration: The component will help strengthen hydro-meteorological observation systems to ensure that regional and national infrastructure is adequate to support observation, forecast and delivery of weather, water and climate services that meet the country's identified economic and societal needs.

Table 2: Expected Outcomes and Outputs

Component	Expected Concrete Outcome	Outputs	Financing (US)
1. Component A			**1 M**
Institutional and Technical Capacity Development of the Meteorological Service of Mauritania:			
	• Increased institutional capacity of ONM to deliver sector specific weather and climate services and contribute to socio-economic development and poverty alleviation.	• Established Early Warning System • Improved NMHS capacity in strategic and technical planning • Enhanced strategic approach to client service within the ONM • Improved Technical capacity of ONM • Increased exposure and recognition of the ONM within national government enabling them to affect national policies concerning weather and climate.	
2. Component B			**1 M**
Improving the provision of Weather and Climate Services and Early Warnings for Severe Weather and Climate Events and related hazards (floods and storm surge) by the NMHS.			

Component	Expected Concrete Outcome	Outputs	Financing (US)
	• Reduced vulnerability and loss of life and property of coastal communities to weather and climate hazards • Increased resilience to climate variability through sensitization and improved interaction between the service providers and the user communities • Delivery of more accurate weather and climate forecasts and early warnings that meet end-user requirements	• Defined suite of weather and climate products and services based on sector specific requirements • Developed suite of sustainable user-defined products and services specifically for: - Weather hazards and sea safety - Flood risks - Climate variability - Coastal Inundation • Increased use of appropriate and effective channels of communication to deliver services to communities	
3. Component C			**1.5 M**
Improve Hydro-meteorological Observation Networks and related IT infrastructure for Data Management and Integration			
	• Improved monitoring and predication of sever weather on coastal communities • Improved data management infrastructure to facilitate data collection, analysis, exchange and integration thereby improving the quality of products delivered to end-users	• Strengthened observation network at the national level • Improved NMHS capacity to manage and maintain observation networks • Strengthened IT infrastructure to enable the delivery of products and services • Established Virtual Private Network to facilitate the exchange of weather information both within and amongst participating countries	
4. Project Execution Costs (ONM)			**345,000**
5. Total Project/Programme Cost			**3,845,000**
6. Project Cycle Management Fee charged by the Implementing Entity [10]			**326,825**
Amount of Financing Requested			**4,171,825**

PROJECTED CALENDAR:

Indicate the dates of the following milestones for the proposed project/programme

MILESTONES	EXPECTED DATES
Start of Project/Programme Implementation	01/01/2012

[10] *The project will be implemented by WMO using the MIE modality. WMO is able to provide the following implementation services through its regional office and headquarters: project identification, formulation, and appraisal; determination of execution modality and local capacity assessment of the national executing entity; briefing and de-briefing of project staff; oversight and monitoring of AF funds, including participation in project reviews; receipt, allocation and reporting to the AF Board of financial resources; thematic and technical capacity building and backstopping; support with knowledge transfer; policy advisory services; technical and quality assurance; and troubleshooting assistance to the national project staff.*

Mid-term Review (if planned)	01/06/2013
Project/Programme Closing	31/12/2014
Terminal Evaluation	01/06/2015

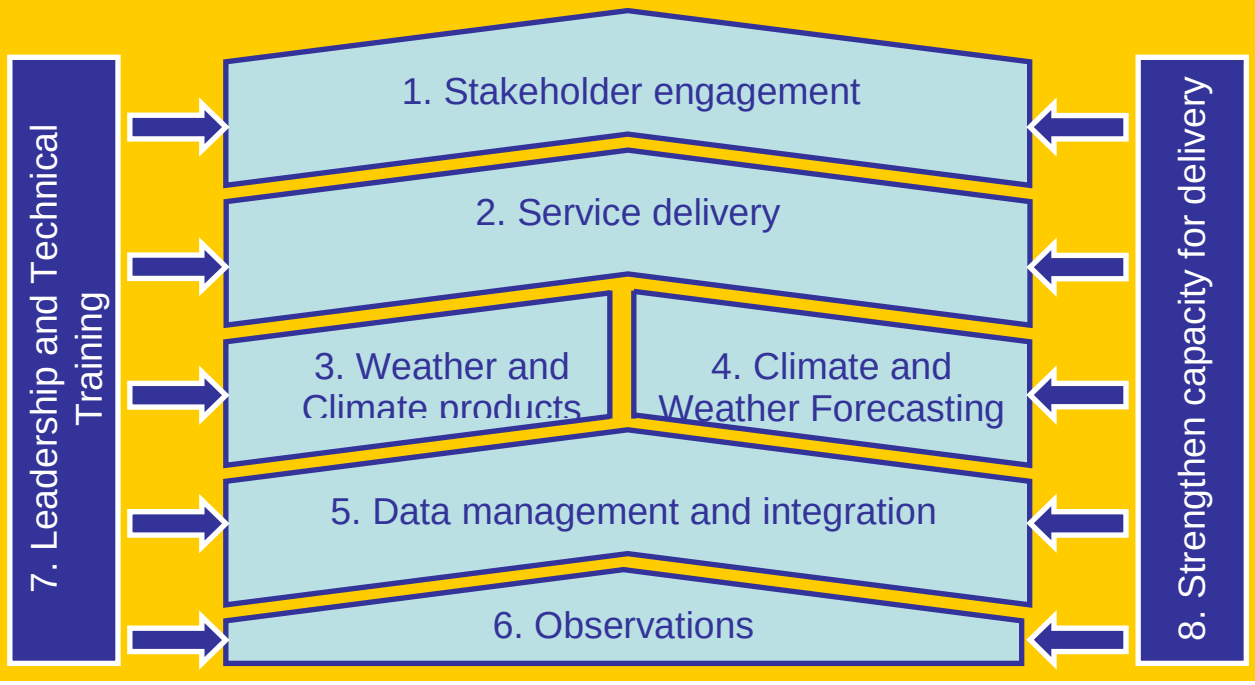
PART II: PROJECT / PROGRAMME JUSTIFICATION

A. *Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.*

The three components which constitute this programme are designed to establish an "end-to-end" system for delivery of weather and climate information services to targeted users and economic sectors in Mauritania and to support National Early Warning Systems for Coastal Weather and Climate Hazards and related events such as coastal flooding from both riverine and storm surge elements. The key process flow elements of this "end-to-end" system are detailed in Figure 1.

A WMO survey in 2008 revealed that most West African countries lack the expertise in marine meteorology to implement an effective warning system and disaster mitigation strategy, despite the significant needs of the marine transportation sector, national structures in charge for marine safety and fishing communities. Furthermore, WMO initiated a pilot project on "Marine Meteorology for the Northwest African Basin" under the Spanish-funded "West Africa Cooperation Programme." The project was launched in July 2009 covering four countries: Cape Verde, the Gambia, Mauritania and Senegal. It aimed at providing specific tools and technology transfer to West African national meteorological services to improve marine meteorology forecast. However, this project is not aimed at operationalising services delivery to vulnerable communities and has a limited fund for observational infrastructure necessary to monitor meteorological - oceanographic parameters to enable the predication of more accurate forecasts. Gambia has recently become recipient of GEF-LDC financing to address this issue (*Vulnerability Strengthening of The Gambia's Climate Change Early Warning Systems)* through a series of activities similar to those proposed here.

Figure 1: Sustainable weather and climate services supporting Climate Adaptation in Mauritania



The methodology described throughout this project document is designed to ensure that cohesive national projects are undertaken that will ensure a sustainable legacy upon completion. That legacy will include sustainably managed climate and weather observing infrastructure together with the data integration, forecasting, analysis and communication tools necessary to manage the data and issue weather and climate warnings to vulnerable communities tailored to the needs of specific coastal communities. Most importantly, this project will deliver an ongoing and sustainable warning service to coastal communities of Mauritania, which will immediately reduce exposure to climate hazards and ensure continued climate resilience in the future.

The Meteorological Service of Mauritania (ONM) have the national mandate to monitor weather and upper-ocean parameters and deliver forecasts to protect lives, natural systems and properties as well as to contribute to the effectiveness of economic activities dependent on weather and climate information and services. The NMS is mandated to operationally monitor weather parameters related to their national observing network and issue seasonal forecast and short-range weather forecasts and warnings in case of adverse weather.

According to Mauritania's NAPA, a national report on research and systematic observation was developed dealing with the following issues:

- Programs and activities in progress and perspective in the fields of meteorological, hydrological, research and climate observation;
- Monitoring programs of desertification and ecosystem quality and other indicators of climate change;

- Existing barriers to the development of observing systems and research;
- Assessment of the current system of early warning of extreme weather events (i.e. temperature and precipitation extremes, droughts, floods, mudflows, avalanches, etc.)
- Methods of seasonal forecasting, including identification of gaps, barriers and development requirements

Although the report mentions the existence of some ability in research and systematic observation, it also indicates the need for institutional strengthening and technical, particularly in the areas of:

- Training in research and systematic observation
- Collection and analysis of data
- Development and practical training on climate monitoring
- Establishment of an Early Warning System on extreme weather events.

While the Meteorological Service of Mauritania is monitoring weather parameters, albeit not sufficiently in most areas, and providing forecasts on a daily basis, they have not begun to analyze how the information they provide is utilized for decision making. More specifically, there is still a lack of knowledge related the appropriate format the information should be disseminated and how channels of communication can be improved for effective integration of weather / climate in decision making. In general, the delivery of services stays at administrative level, e.g. warnings are only sent to governmental institutions in charge of disaster management and sea safety through administrative channels. General forecasts, typically valid for 24 hours are issued on a daily basis and delivered to the public through classic media (TV, radio, newspaper) but these forecasts are not specific enough to meet the needs of vulnerable communities.

Discussions with stakeholders involved in maritime / coastal activities and local communities benefiting from marine / coastal resources or living near the coast through other projects have begun the process of understanding the user requirements. For example, since 2007, the ONM has included colour-coded flags in its marine bulletin to enable quick analysis of the dangers at sea for illiterate users.

Such multi-disciplinary and inclusive process can be replicated to improve communications and service delivery for vulnerable communities in coastal areas. Appropriate formats and distribution channels can be determined with the targeted communities through workshops and consultations. Delivery of forecasts and early warnings, from daily, seasonal and longer timescales, can be preceded by sensitization actions on climate change and variability and their impact on coastal environment and activities and the necessity to adapt to the increased intensity and frequency of weather hazards.

Component A: Institutional and Technical Capacity Development of Meteorological Service of Mauritania**:** The component will help strengthen the NMHS to ensure that it has the institutional and technical capability to sustainably observe, forecast and deliver weather, water and climate services that meet the country's identified economic and societal needs.

Sub-Component A.1 Institutional Capacity Development: An important aspect of the overall capacity development of the Meteorological Service of Mauritania as well as the other stakeholders engaged in the project is strengthening institutional structures and leadership skills.

A1.1 Organisational Structure for delivery: In order to ensure sustainable delivery of the services that will be designed and implemented through this project, it is important to strengthen the processes within the ONM for delivering services. A specialist consultant will work with the teams within the meteorological department, and with the other government departments and stakeholders who will be responsible for delivering services, to help design processes to ensure the efficient delivery of the products – to those who need them most. These processes will define:

- Who is responsible for various aspects of production and dissemination?
- Which aspects of the products generated through this project will be created on a regional – and which will be created on a national basis?
- What tools, observations, predictions that they use to create the products?
- Who they disseminate the products to?
- How they will disseminate the products?
- How they will ensure that the production system is resilient?

Sub-Component A.2 – Improved weather and river flow forecasting and climate change assessment systems with access to, and use of, global and regional numerical weather prediction products. This activity will improve forecasts of extreme weather events using a model already proven to be successful in Southern and Eastern Africa the WMO "Severe Weather Forecasting Demonstration Project" (SWFDP) as outlined in Annex 1. This approach takes advantage of advances in numerical weather prediction in leading global forecast centres. Improving high-impact weather forecasts depends on access to numerical weather prediction products from major global centres and capacity to adapt these products for the specific needs of a geographical region. Key elements include ability to understand ensemble predictions (probabilistic forecasting methods) and apply them to forecasts for specific user applications; and capacity to access large volumes of information from global centres via the Internet.

A2.1 Forecasting for development:

At the centre of the SWFDP concept is the establishment of a "virtual" regional centre which provides guidance information for all participating countries. Dakar, in Senegal, will be the hub for the virtual regional centre as it is already designated as a Regional Specialised Meteorological Centre (RSMC) by WMO and is a regional hub of the WMO Global Telecommunication System (GTS). The Spanish sponsored MarineMet project has also established Dakar as the regional hub for marine forecasting. Through the SWFDP, global centres will make available both global and regional observational and forecast data. These centres have included for previous SWFDPs: the National Weather Service in the USA; European Centre for Medium Range Weather Forecasting; Eumetsat the European Weather Satellite organisation; the Spanish Met Department AEMET; and the UK Met Office. This area f development will be supported by the WMO Regional and Global Network of Centres for Numerical Weather Prediction[11] and model downscaling as per Figure 2 and 3 below.

[11] Centres designated by WMO for the provision of global long-range forecasts are called Global Producing Centres for Long-range Forecasts.

Figure 2: WMO Coordinated Global/Regional Operational Network

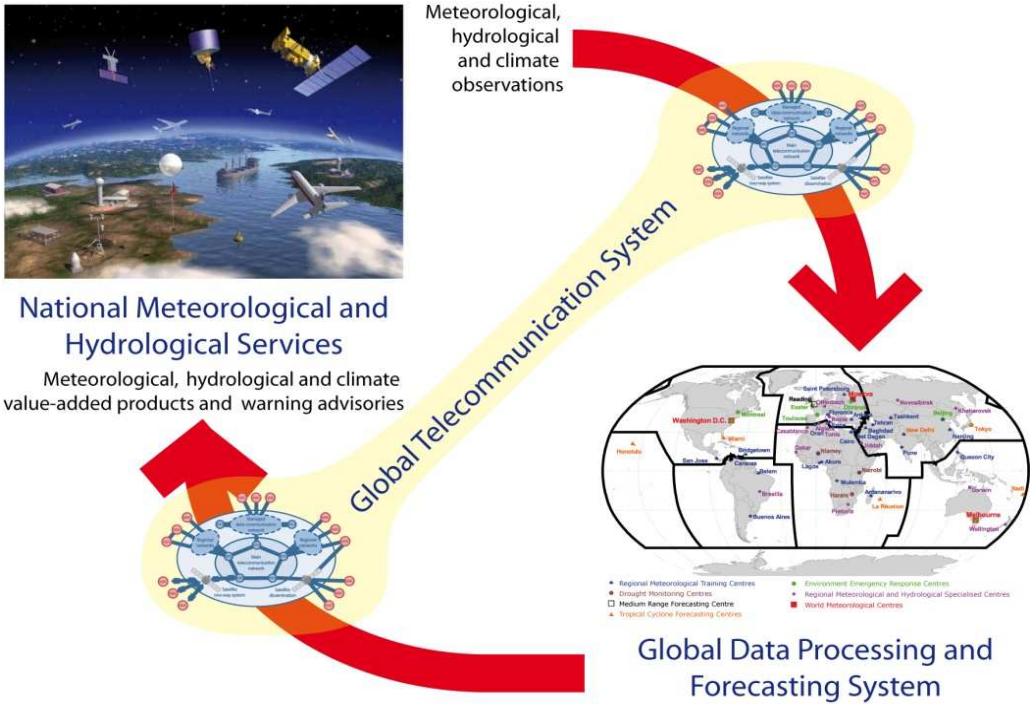
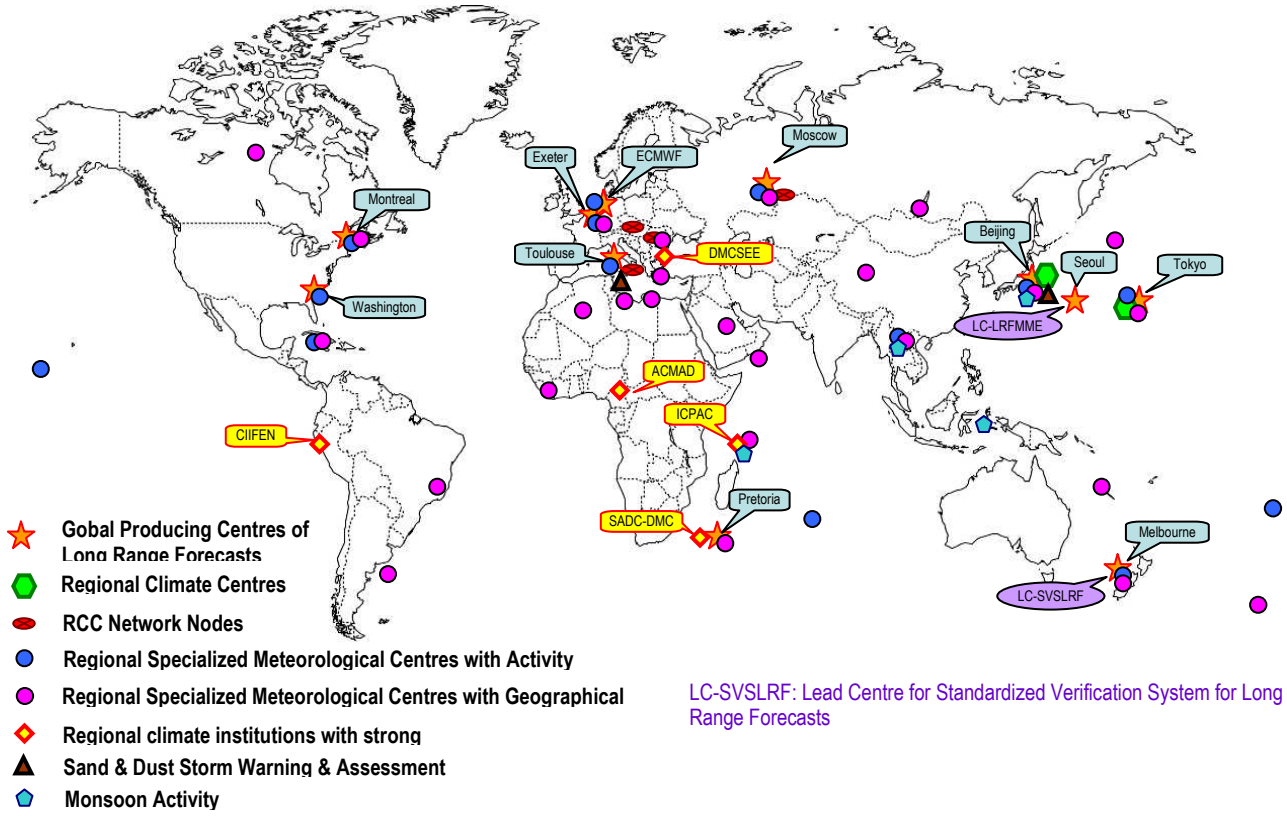


Figure 3: WMO Global and Regional Specialized Meteorological Centres and Climate Centres



LC-SVSLRF: Lead Centre for Standardized Verification System for Long Range Forecasts

A2.3 Integrated Flood Management: WMO has been one of the main partners collaborating in the area of strengthening flood forecasting and Integrated Flood Management in the region (cf Senegal, Volta and Niger HYCOS programmes). The WMO Integrated Flood Management (IFM) approach calls for a paradigm shift from the traditional, fragmented and localized approach, and encourages the use of the resources of a river basin as a whole, employing strategies to maintain or augment the productivity of floodplains, while at the same time providing protective measures against losses due to flooding (Annex II).

The activities proposed in this project aim for a more integrated and coordinated approach in Mauritania building on the example of these existing projects and work already undertaken in Mauritania through a series of National workshops in 2010. This activity will include:

1. identification and implementation of latest tools and methodologies for flood forecasting,
2. development of regional data products that enable better estimation of precipitation (e.g., radar and satellite data products), and
3. development and utilization of better forecasts of severe weather and extreme precipitation.

Specifically, through the funds being sought from AF coordination forums and technical consultations will be held and tools, methodologies and requirements for products and services of Flood Information System will be identified. Trainings for Hydrological Service in the utilization of Flood Information System and WMO Flood Management HelpDesk will be conducted and in-country technical assistance for strengthening utilization and feedback mechanisms for improvement of flood products and services will be provided.

Component B: Improving the provision of Hydro-meteorological Services and EWS for Severe Weather, Floods and Storm Surge by the Meteorological Service of Mauritania. This component will ensure that each agency has a sound understanding of the needs of their constituency for weather and climate information and that they have a comparable level of expertise in the production of information and delivery of hydro-meteorological services.

Sub-Component B.1 – Enhance the service delivery system through: (i) development of improved services provided including expanded user access to informational products; and (ii) specialized training to staff involved in service delivery. Today, more economic sectors are weather and climate sensitive; this has created a new client base for forecasting products and services. However, users often have little knowledge or understanding of how weather, water and climate specifics affect their decisions so a more collaborative approach to service delivery is required. Joint training of ONM personnel and users will improve sector knowledge within the ONM staff and educate technical staff in the user sector about basic meteorological processes. It is anticipated that this will lead to joint development of decision-support tools for weather and climate sensitive sectors to integrate meteorological information more effectively.

Through this project, capacities will be developed at the ONM for packaging and disseminating early warning messages. In collaboration with community based organizations and end-users at project sites, models of forecasting and risks communication will be developed, tested and used. Outputs, feedback and lessons learned from these activities will be synthesized and used to improve early warning information communication to end users to stimulate adaptation responses to climate change.

To this end, the following activities among others will be carried out:

i) identify, test and use the most appropriate and effective channels of communication for the various users of the NMHS products;
ii) provide training on climate change risk assessment, including the development of decision making support tools that end-users and district level decision makers living in the selected sites could use to manage climate linked risks;
iii) document and analyze the outputs of the above activities for future use and improvement of the dissemination of NMHS products

Forecasts and early warning messages will now be packaged and delivered in a targeted manner to sensitize end users including communities, government and the private sector which would therefore be unable to adapt to climate hazards.

B1.1 Service delivery and communication to users: It is clearly recognised in this project that the lasting legacy will be the suite of sustainable climate and weather services that are tailored to the needs of coastal communities. In order to achieve this legacy it is essential to consider the drivers, from the outset of the project, to ensure the ONM has the capacity and the incentives to continue to deliver the services after its completion.

General forecasts, typically valid for 24 hours are issued on a daily basis and delivered to the public through classic media (TV, radio, newspaper) but these forecasts are not specific enough to meet the needs of vulnerable communities. Improved understanding of client needs can be derived from participative national and local forums. Participants are sensitised to the uses of weather / climate information in their sector. Such workshops serve as feedback mechanisms, whereby service providers improve their understanding of their customers' requirements as well as the manner in which weather and climate information is made available. In turn, their customers are enabled to properly use the provided information to make informed decisions and increase their yield.

Such multi-disciplinary and inclusive process can be used to improve communications and service delivery for vulnerable communities in coastal areas. Appropriate formats and distribution channels can be determined with the targeted communities through workshops and consultations. Delivery of forecasts and early warnings, from daily, seasonal and longer timescales, can be preceded by sensitization actions on climate change and variability and their impact on coastal environment and activities and the necessity to adapt to the enhanced intensity and frequency of weather hazard.

a) Stakeholder Engagement Workshops

An initial series of workshops will be convened to engage coastal communities to understand how existing weather patterns impact on their daily lives. The workshops will engage a wide range of stakeholders from a variety of different sectors. Each workshop will include representative community leaders, relevant government departments (Ministry of fisheries, Agriculture, Disaster Management, etc), as well as NGO's and multilateral agencies working in each sector.

The dialogue will focus on three main areas:

〉 Weather hazards and safety at sea
〉 Managing coastal flood risks
〉 Climate variability and food security

The aim of the series of workshops will be to form a series of user requirements which will define the suite of services that will be established during the other components of the project. This will include:

- Which weather and climate hazards have the biggest impact on communities?
- Are there specific events that can be characterised and analysed? (i.e. specific floods, droughts, etc.)
- What sort of service would be most helpful – whether it is an observational data product, short range forecast (<3-days lead-time), longer range forecast (seasonal), or climate change analysis?
- What is the most appropriate delivery mechanism (radio, TV, internet, telephone, SMS, email, etc)?

c) Community sensitization: Launch of Services

To successfully launch new climate and weather products, it is essential that the benefiting communities are sensitized and trained in how to use them. To achieve this we will learn from past experience of successful delivery of weather information in other parts of the world. It is essential that each individual, community, or institution using the climate and weather information understand its strengths and limitations. They need to know how to act upon the information to reduce vulnerability to the weather hazard.

B1.2 Weather and climate product generation and service delivery: Following on from the initial stakeholder workshops in each country, the project team will define the suite of new products and services that will be developed through this project. They will work with the stakeholder steering group (described in 1.1 above) to ensure that whilst the services defined closely meet the requirements of the end users, they are also deliverable and sustainable products. This will ensure concrete outcomes for this project.

a) Product design and technical development

The aim will be to create a suite of sustainable services that are closely tailored towards reducing coastal communities' vulnerability. For each of the products designed, an IT interface will be developed that will allow forecasters at the meteorological department to disseminate the suite of products to the end users – either directly or through third party stakeholders. Where possible the product suite will be consolidated onto a single production and dissemination IT platform irrespective of the final user. The platform will also be designed in a manner that is flexible to allow the meteorological department to expand their product portfolio in the future. Both the dissemination platform and the information conveyed – will be designed in a way that is consistent with relevant WMO guidance. This will ensure that they will follow best practice techniques that help to ensure that the products are delivered in the most meaningful and efficient manner possible.

b) Pilot Service Delivery

The services will be delivered to the chosen pilot stakeholder communities / sectors. During the pilot phase, delivery of each service will be monitored and evaluated. Lessons learned will be used to refine each product and develop a strategy for the larger scale implementation.

c) Scale up

To scale up the services from a closed community group to a wider scale service that would benefit the millions of people living in the coastal regions will involve a substantial information dissemination system involving a number of media and sophisticated outreach techniques.

These will include:

- Radio
- Newspapers
- Local Government
- NGOs
- Mobile Phone Services

d) Increased exposure and recognition of the Meteorological Service of Mauritania within the national government through the completion of this project.

Throughout the project, the Meteorological Service of Mauritania will work closely the national government to ensure that the value of the products and services developed are fully recognised. This increased visibility often leads to recognition by the national governments that further continued investment in the meteorological departments, and in particular increased human resources, will yield national development benefits. For this purpose, the communications campaign associated with this project will specifically target the participating National Governments.

Component C: Improving Hydro-meteorological Observation Networks and related IT infrastructure for Data Management and Integration: The component will help strengthen hydro-meteorological observation systems to ensure that regional and national infrastructure is adequate to support observation, forecast and delivery of weather, water and climate services that meet the country's identified economic and societal needs.

Sub-Component C.1: Equipment restoration and improvement for meteorological, hydrological and climatological observations: The rehabilitation and improvement of meteorological and hydrological observing networks will enable the NMHS to provide timely warnings to agencies responsible for reducing and preventing injury, death and economic losses related to extreme weather events. Mitigation of consequences and better emergency preparedness are important components of the modernization program. Improving hydrological observation and forecasting systems is also essential to manage national water resources, cope with climate variability and provide data for climate change adaptation. To monitor weather, climate, and water, new automatic and semi-automatic weather and hydrological stations will be installed, along with means to calibrate and maintain these networks.

Activities under this component are designed to build on the existing rudimentary and ineffective networks, improve the extent of national coverage and upgrade their capacity to collect data especially those related to climate change and climate related disasters. It will also strengthen and increase capacity to maintain archives, and the digitization of historical data thus providing solid evidence-based climate related information.

Specifically, resources will be allocated to:

i) Develop an acquisition and rehabilitation of equipment plan based on existing and refined needs assessments;

ii) Repair/upgrade existing, acquire, install and test run new infrastructure including synoptic automated stations, higher capacity data processing and storage equipment;

iii) Develop a comprehensive staff training needs assessment based on identified capacity needs;

iv) Implement a training programme to meet identified needs;

v) Acquire data treatment software for modelling applications, vulnerability mapping and downscaling methods;

vi) Use data to enrich climate information and development of targeted early warning messages and weather forecasts.

Without the intervention the hydro-meteorological network stations for collecting data and information related to weather patterns and monitoring climate change, observations will continue to be inadequate both in quantitative and qualitative terms, and could lead to the inability of the system to provide a crucial service required for taking adaptation measures by a large proportion of the population. More specifically, they will either be absent where they are needed or where present, will continue to lack critical instruments required for the collection of reliable data and information. In cases where some data are collected, their analyses, interpretation and transformation into forecasts and early warning messages would be difficult because of the lack of sufficiently powerful processing electronic hardware and climate-based analytical tools and software, as well as trained technicians and professionals to use them, i.e. a human capacity issue. Climate risks will therefore not be properly assessed and communicated to stakeholders and end users including policy makers who may therefore not factor them into national policies and plans.

C1.1 Observation Network: This project will strengthen the observation network of Mauritania. Whilst most of the monitoring systems will be installed in coastal regions, some will be installed inland to monitor weather advancing towards the coast. Ground water monitoring stations will also be installed as much of the flooding results from sustained rainfall which causes groundwater levels to rise and cause flooding.

The design of the network distribution, led by the Meteorological Service of Mauritania, will be developed at the beginning of the project implementation. The design will be done with a view to improving the monitoring and prediction of the severe weather that greatly impacts coastal communities. The stations will be procured and installed following the WMO CIMO Guide which gives guidance on quality of instruments and installation.

Sustainability of observing systems: All observing systems require on going maintenance and regular calibration. This is often overlooked in project design. A component of the project will include the strengthening of ONM's capacity to manage and maintain the network of instruments installed. This will include the following training elements:

i) Correct exposure and location of observing equipment

ii) Installation (so that future installations can be completed by local staff)

iii) Developing caretaking, maintenance and calibration processes and procedures.

iv) Identifying when faults have occurred

v) Swapping out faulty equipment

vi) Conducting regular inspection visits.

vii) Maintaining logs of metadata.

viii) Calibration.

ix) Understanding data output formats and error messages.

On all procurement, sufficient spares will be included and in some cases an ongoing maintenance agreement to ensure that the measurements continue in a sustainable manner into the future.

C1.2 Communications: A Virtual Private Network (VPN) will be established to facilitate exchange of weather information both within Mauritania and with neighbouring countries through the WMO Regional Specialized Meteorological Centre[12] at Dakar, Senegal and globally through the WMO GTS[13]amongst the participating countries in this project.

C1.3 Integration of observations: The observations collected through this project must be collected and integrated centrally at ONM main Centre to provide for both for real time weather monitoring and climate analysis. ONM will secure necessary IT Hardware and software to accomplish this. Training on utilization of integration system will be an important aspect of this modernization.

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.

The National Action Plan for Adaptation (NAPA): The project is highly consistent with Mauritania's national priorities and plans, as it reflects priority activities identified in both the Second National Communication and the NAPA. National priorities with regards to climate change events and its multiple impacts are comprehensively taken into account in the NAPA, which itself was developed in a participatory manner and featured priorities and concerns of a variety of stakeholders including rural and urban communities, non-governmental and community based organizations, the private sector, the scientific community and various components of government. Care was also taken to align the NAPA to the thrusts and priorities of a number of important national development plans.

The results of studies from the NAPA process indicated a high vulnerability of the city of Nouakchott to flooding associated with high risk of rupture of the coastal dunes to the west and to 'burial of economic infrastructure by shifting sand dunes under the influence of dust storms in the east and northeast'.

National Communication: The project has direct links with additional national plans and priorities to fight against poverty and sustainable development programs undertaken in the country. In this context, the project will work for the preservation and safety of lives and property. All of these policy instruments pursue a common goal of ensuring sustainable development through a rational utilisation of a limited natural resource endowment. A goal that is also shared and reflected in the policies of several sectors and services such as: agriculture, fisheries and forestry; health delivery services; and coastal zone management, a particularly vulnerable sector.

More specifically, the project is meets the objective identified on the Second National Communication of Mauritania where it calls for the establishment of an observation and monitoring system off its coast. Activities include expanding the spatial coverage of

[12] WMO RSMC: Existing national or regional centres which have accepted responsibilities by multilateral or regional agreement, or centres implemented by a joint cooperative effort by several countries in a Region.
[13] WMO Global Telecommunications System

meteorological observation network and capacity building of stakeholders, among others. The expected result is the establishment of an early warning system for extreme weather events.

Strategic Framework for the Fight against Poverty (PRSP): Mauritania has developed a Strategic Framework for the Fight against Poverty (PRSP) for the period 2001-2015, adopted by the framework law on the fight against poverty No. 050 / 2001 of 25 July 2001. This strategic framework to fight against poverty, which draws its legitimacy from the participatory process, is the reference of the government in formulating economic policy in the development plan is the country's medium-, long-term and strategic significance which enshrines poverty eradication as a national imperative, the priority of all policies of the country.

Reducing poverty and accelerating economic growth are the two pillars of intervention for the PRSP II (adopted in 2006), both of which can only be achieved through the adoption of sustainable natural resources, conservation and renewable resources management.

This project will contribute to achieving this.

The Sustainable Development Strategy (NSDS). The NSDS place in its objective, the people at the centre of the decision, with the priority needs of the poorest and most marginalized. It intends to build consensus on a common vision of sustainable development in the country long term, through a strategic approach that integrates the social, economic and environmental. It defines the major priorities under which should concentrate the action for the country's development can be sustainable. These five fundamental pillars are: (i) Strengthening institutional capacity and political and effective management of the environment and natural resources, (ii) for given sustainable access to basic services as a strategic means to fight against poverty, (iii) the support given to an integrated and participatory management for efficient use of natural resources, (iv) the management of local and global environment in accordance with the commitments made in international conventions; (v) the development and implementation of a funding mechanism for its National Action Plan for Environment and Sustainable Development.

The Millennium Development Goals (MDGs): The project will contribute to the achievement of MDGs, in particular of MDG 1 (“eradicate extreme poverty and hunger”) and 7 (“ensuring environmental sustainability”), by reducing vulnerability to climate change through a strengthened early warning and information sharing mechanism. This will facilitate informed decision-making by the government and the affected population which in turn is expected to improve the agriculture production and the livelihood of communities in the face of a changing climate.

[CR 4 – R] ***Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations.***

Project benefits will be widespread. The activities will benefit all hydromet service consumers in coastal areas and areas targeted for flood related interventions due to increased reliability and timeliness of hydromet forecasts. The benefits include reduced human vulnerability to natural hazards, reduced risk of damage to property and the potential for overall reduction of economic losses as a result of hydromet related natural disasters.

Estimating the number of indirect beneficiaries is inherently difficult given the public goods nature of the products and services that the project will provide. Communities living close to the sea, farmers, fishermen, schools/youth, hospitals/public health authorities, the disabled and the tourist population from the targeted islands will also be engaged directly and benefit from this initiative.

Also, critical facilities such as airports, seaports, hotels, schools and health care facilities will be directly targeted for this project for the development of targeted warning messages and dissemination channels that can help them respond more effectively.

As economic activities in the coastal zone are widely varied it is anticipated that women will benefit equally with men in the project in particular those in fishing communities that are amongst the poor and vulnerable.

Additionally information weather and climate information can yield multiple indirect benefits for the public and private sectors in the longer term by generating more reliable data that can support economic activities in sectors such as agriculture, energy, and transportation. For example, if farmers were interested in insurance products to cover weather risks, insurance firms would need reliable weather information to provide relevant products and services. This Project could help provide such information in the medium-term.

The WMO has a strong policy on gender equality. The WMO vision is to provide world leadership in expertise and international cooperation in weather, climate, hydrology and water resources, and related environmental issues, and thereby to contribute to the safety and well-being of people throughout the world and to the economic benefit of all nations. The gender perspective of this vision is to realize fully the professional and human potential of both women and men through equal employment opportunities and to provide improved environmental services that are responsive and sensitive to women's and men's needs and will make a difference to their lives.

In the process of achieving enhanced disaster preparedness, community members and community-based organizations will be enabled to improve their communication and outreach activities, and engage with the Coastal and IFM Early Warning Sytems in important relay functions. This will contribute to broader economic and social development benefits for local communities in the area. At the policy level, the project will provide an enabling environment for the integration of climate change adaptation and risk management considerations into 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.

[CR5 R] Discuss the cost effectiveness of the project including the proposed response to alternatives.

There has been little work done to date in Africa on cost-effectiveness of investing in modernization of NMHS and enhancement of service delivery to support economic sectors and community safety. Studies underway on Kenya[14] are focusing on the agricultural sector only.

For most NMHS, this type of assessment poses a great challenge due to the absence of a generally accepted methodology for assessing the effectiveness of NHMS delivery or modernization programmes; lack of basic econometric information needed to assess losses and benefits, and the shortage of expertise in NMHS and weather dependent sectors capable of

[14] Socio-Economic Benefits of Meteorological Information and Services in Kenya – The Agriculture Sector: Kenya Meteorological Department (KMD) in collaboration with the University of Nairobi, Ministry of Agriculture, Ministry of National Planning, Kenya Agricultural Research Institute (KARI), and IGAD Climate Prediction and Applications Centre (ICPAC)

making this assessment. The process of collection and evaluation of the information is time-consuming and requires substantial funding which is often unavailable.

WMO with UNISDR and World Bank, jointly with a number of NHMS in Europe and Asia (among them Albania, Armenia, Azerbaijan, Belarus, Croatia, Montenegro, Serbia) has been engaged in developing and piloting new approaches for estimating additional economic benefits from the modernization and development of HMS, as well as for assessing the current economic benefits from existing HMS[15]. These efforts were driven primarily by practical considerations in the process of development modernization initiatives and fostering a better dialogue between HMS and national economic and fiscal authorities.

The estimates of economic losses from hazardous weather events varied between 0.32 per cent of GDP for Kazakhstan and 1.25 per cent of GDP for Armenia. For the target countries the assessment of the prevented losses was undertaken for the first time and while the results should be viewed as tentative, nonetheless, they indicate a high economic value of the hydrometeorological services and information. Estimates of relative economic efficiency of the existing NMHS, calculated by comparing the estimates of prevented losses and the cost of NMHS funding, show that the efficiency (or benefit-cost ratio) is rather high, ranging from 165 per cent for Azerbaijan to 568 per cent for Albania. Overall, for each dollar spent for supporting the existing NMHS, the countries usually gain two or more dollars through the avoided economic losses. The study indicated that an annual incremental benefits of the proposed modernization (improving the status of NMHS and HMS delivery from 'poor' to an 'adequate') will be quite substantial for all the countries concerned. The repayment period of investments in NMHS modernization will be within two to three years. The economic efficiency of the proposed modernization for those countries (assumed to be accrued evenly over the seven year period) ranges from 210 per cent for Armenia to 880 per cent for Serbia assessed by the benchmarking method. Estimates based on sector-specific assessment show even more favorable efficiency ranging from 500 per cent for Belarus and Albania to 1,440 per cent for Azerbaijan.

It is anticipated that benefit-costs for Mauritania would like in these ranges and be strongly positive overall.

There are no alternative avenues for provision of weather and climate information and Early Warning Services for HydroMeteorological events in Mauritania other than the Government mandated services addressed here. Lack of significant improvements in these services will continue to result in significant loss of life and damage to property and economic infrastructure in coastal and floodplain areas.

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

This project does not duplicate any projects currently underway in Mauritania.

[CR 7 R] This project mirrors in a general sense a project in neighbouring Gambia for improvement of weather and climate services in a similar manner funded by the GEF LDCF and about to commence in ***Gambia: Vulnerability Strengthening of The Gambia's Climate Change Early Warning Systems.***

[15] Strengthening the Hydrometeorological Services in South Eastern Europe - South Eastern Europe Disaster Risk Mitigation and Adaptation Programme (UNISDR, WB, WMO, FMI 2009).

The components of this project are:

Outcome 1: Enhanced capacity of hydro-meteorological services and networks for predicting climate change events, risk factors and issuing early warnings

Outcome 2: More effective, efficient and targeted delivery of climate information including early warnings

Outcome 3; Improved and timely preparedness and responses of various stakeholders to climate linked risks and forecast vulnerabilities.

There are already strong links between Mauritania and Gambia NMHS through the Regional Meeting of Meteorological Directors and through initiatives under the Programme of Cooperation (in Meteorology) for West African Countries (AFRIMET) funded by government of Spain. There will be a valuable opportunity to transfer experience from that project in relation to Observation Network Design, specifications and procurement and in particular in relation to community engagement for development of information products and services and feedback surveys. A twinning arrangement will be fostered between the two NMHS in this regard.

This project will compliment and support other projects underway in Mauritania:

i) The proposed WB / CDCF support for capacity building on funding climate change.

The World Bank, as partners of Mauritania in the project, has developed a strategy based on wide consultation. At the end of this ongoing process of consultations, it was chosen primarily to integrate adaptation and climate risk in the options of development of countries, sectors and to focus on ecological processes, enhance existing opportunities to develop capabilities and expand resource mobilization.

This strategy focuses on making climate change adaptation and climate risk management an essential component of development. It focuses on the following priorities: disaster management, agriculture, irrigation, water, soil, and waste management. It also focuses on the development of knowledge and capabilities to better manage climate risk, build resilience to hazards of natural disasters, revision of building codes, standards, planning and building standards to reduce risk and build resilience.

ii) Adaptation to climate change - responding to coastline change in its human dimensions in West Africa through integrated coastal area management

The objective of this GEF-funded 4-year project (2007-2011) being implemented by UNDP is to mainstream adaptation to climate change into Integrated Coastal Area Management (ICAM) planning through the development and implementation of pilot adaptation activities in response to shoreline change. This involves the development of strategies, policies and measures, based on technical/scientific information and appropriate policy instruments. A major preliminary objective is to pilot adaptation activities in a local to sub-regional context. It is a regional project that involves Gambia, Senegal, Guinea Bissau, Cape Verde and Mauritania with a budget of about $ 9,800,000.

[CR 8 R] If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

The project will use interactions with pilot communities to show how properly packaged and well targeted weather and climate information early warning messages could help communities living in vulnerable areas to prepare for and adapt to severe weather and climate and climate change events, and then synthesize lessons learned for replication elsewhere with the ultimate goal of improving EWS performance nationally.

Building on participative processes initiated under Components 2 of the project, and drawing on the technical experiences in the establishment of early warning systems under Component 1, the proposed project will introduce targeted activities to enable the analysis, replication and upscaling of the project approach more widely as part of the routine services of the OMN. This will entail a campaign to present the findings from the project to different public entities and development partners, as well as other district entities with similar degrees of vulnerability.

This systematic documentation of experience in interaction with communities will assist the replication of early warning systems. Other maritime countries in the region will also benefit from the knowledge generated through the project. This proposed initiative will contribute to a critical mass of experience and enhance systematic regional cooperation on this critical adaptation issue.

Additionally, surveys will be undertaken in target communities to assess community perceptions on the benefits and successes of the project and further refine the services provided by ONM.

A communication strategy for the project will be developed, 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).

The project will also generate evidence on the cost effectiveness of building institutional adaptive capacity in order to develop a case for policy and budgetary adjustment to ensure greater sustainability. The project is designed to complement other ongoing and planned projects and programmes without duplicating them and to build on the existing systems in place.

Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation.

[CR 9 – R] In July 2009 in Nouakchott (Mauritania) a national workshop was held on Integrated Flood Management (IFM) with the main goal to demonstrate the concept of IFM to the relevant state services, local administration and other stakeholders. The workshop was organized as an element of a general strategy to improve national capacities to cope with flood events, designed after extensive consultations between WMO and Mauritanian authorities. It also offered the opportunity to provide the first short course on IFM in French language as APFM capacity building activities. The workshop was attended by experts and officers of the Ministries of the Interior and of Infrastructure and Transport, members of the National Crisis Commissions, parliamentarian and local administrators of flood prone areas, representatives of the various relevant technical State services as well as of UN Systems and NGOs. As a follow up to the workshop, it was decided to implement demonstration projects on IFM in selected areas in the countries, notably Tintâne and the catchments of Gorgol, Ghorfa and Niordé rivers. The focus

will be on improved flood forecast through the integration of meteorological and climatological information and on strengthening the response capacity of the local communities.

On the maritime side, a regional review was undertaken in late 2009 and an onsite study of networks in Senegal, Mauritania, Cape Verde and Gambia to elaborate needs for maritime observing networks.

Overall the following Ministries have been consulted and focal points designated:

- Ministry Delegate to the Prime Minister of the Environment and Sustainable Development
  - Cellule de Coordination du Programme National Changement Climatique (CNPCC)
  - Department of Programming, Coordination and Environmental Information
  - Management of protected areas and coastal
  - Parc National du Banc d'Arguin
  - National Park Diawling
- Ministry of Equipment and Transport
  - Weather center
  - Port of Nouakchott
  - The Port of NDB;
- Ministry of Interior and Decentralization
  - General Directorate of Civil Protection
  - Urban Community of Nouakchott
  - Wilaya de Nouakchott
  - Wilaya de Nouadhibou
  - Town of Nouadhibou
- Ministry of Fisheries:
  - Delegation to the fisheries surveillance and control at sea;
  - Centre for Coordination and Rescue at Sea;
  - Fishing port: Setting Port Bay Repos
  - IMROP
  - National Federation of Artisanal Fisherie
- Ministry of Defense
  - Navy
- Ministry of Water
  - Department of Water and Sanitation

[CR 10 R] ***Provide justification for funding requested, focusing on the full cost of adaptation reasoning.***

The following analysis reviews the proposed project interventions in the context of the existing development baseline.

Component A: Institutional and Technical Capacity Development of the Meteorological Service of Mauritania.

Baseline (without AF resources):

The current annual government budgetary allocation to NMHS is not sufficient to rapidly alleviate the current infrastructural constraints and human resource capacity limitations and hence narrow or close the gaps identified above and raise the baseline above the rudimentary level. The costs associated with climate change induced damage in Mauritania without effective adaptation are likely to increase over time.

In other words, there is currently a patent lack of adequate financing to rapidly alleviate the crippling infrastructural constraints and human resource capacity limitations responsible for the rudimentary nature of the EWS in Mauritania and hence its ineffectiveness. This project will bring additional resources to tackle this fundamental weakness of the system and allow it to function beyond the current business as usual model. It will contribute to rapidly raising the baseline to a level that can subsequently be used to demonstrate its impact and importance and used to advocate for increased attention and future budgetary allocations.

In the absence of this project the climate change will continue to affect the livelihoods of the communities that rely in climate sensitive systems. Decision makers will continue to be deprived of required information and early warning messages, and hence the mainstreaming and integration of climate change into national development planning and policies will continue to be neglected and when considered the costs associated with such considerations will not be taken into account and secured for their implementation.

Adaptation Alternative (with AF resources):

In the absence of current climate change induced extreme events the hydrological and meteorological services and networks would some extent serve the needs of the country through the provision of daily weather reports and occasional forecasts. The additional burden of longer term climate change projections and forecasts to warn the population on extreme events and prepare them for response reactions is an additional adaptation need imposed on the country by the effects of climate change. The project will contribute to alleviating this additional climate change induced burden through a combination of three logical and related components:

- Weather and climate change information, monitoring and early warning systems;
- Weather and climate change information dissemination and communication to end-users /communities;
- Institutional capacity for climate change policies and protocols.

Specifically, the project will strengthen the capacity of the ONM and the hydro-meteorological networks to predict climate change events and risk factors and improve efficiency of climate information dissemination /delivery to end-users. Additionally the project will increase the capacity of relevant institutions to respond effectively and in a timely manner to climate change warnings and to put in place preventative planning.

Component B: Improving the provision of Weather and Climate Services and Early Warnings for Severe Weather and Climate Events and related hazards (floods and storm surge) by the NMHS.

Baseline (without AF resources):

The current Early Warning System does not, and can not provide credible weather and climate data and information required to sensitize, stimulate and encourage community stakeholders to

take appropriate adaptation measures and policy makers to respond through appropriate policies.

At present, decision-makers and disaster management planners at the national, provincial and district levels do not have sufficient knowledge to assess the impending consequences of severe weather and climate events on their constituencies.

With regards to requirements for Flood, Inundation and Severe Weather Early Warning systems, applied knowledge to inform the population effectively and comprehensively about impending hazards is clearly insufficient at present. Climate Change risks are mentioned in existing policies and disaster management frameworks, but no comprehensive guidelines exist at the district and local levels to deal with tangible vulnerabilities from particular large-scale hazards. Institutional mechanisms and policy instruments are not informed by evidence from risk reduction projects from the field, and likely to remain generic in the absence of concrete projects that can provide tangible evidence about hazard exposure, sensitivity and soft as well as hard measures to address these.

Adaptation Alternative (with AF resources):

None of the other on-going projects is focusing exclusively and/or sufficiently as this project does, on strengthening the early warning system, especially its most critical and vulnerable aspect, that of strengthening its weak data, information and scientific foundation, so that it can effectively collect, analyze, and process, weather and climate change related information and data in order to provide reliable weather reports, forecasts, alerts and early warnings.

In anticipation of the likely impacts, the project will contribute towards reducing these anticipated costs by strengthening the EWS therefore implementing a priority identified in the NAPA.

Component C: Improving Hydro-meteorological Observation Networks and related IT infrastructure for weather and Climate Data Management and Integration:

Baseline (without AF resources):

Specifically for Mauritania, its observing network consist of only 13 synoptic stations and a few hundred rainfall stations. Of the 13 stations, 2 are considered principal stations (Nouakchott and NDB), while the rest only report 12 to 18 hours / day instead of 24h. Climate stations are mostly closed due to lack of meteorological instruments. The upper-air observations have not been in operation since 1993 due to lack of maintenance and spare parts. The main reasons for these inadequacies are:

- Lack of human resources (less than three observers per station)
- Lack of measuring instruments (no station is able to cover the activity of observation)
- Insufficient resources allocated to meteorological activities (management of overtime and night hours).

These observation systems, land and marine based are fundamental for monitoring weather hazards originating from the continent for estimating winds at the coast and for improving numerical models to enable the Meteorological Service of Mauritania to issue accurate forecasts and warnings to vulnerable communities and save lives and livelihoods.

Adaptation Alternative (with AF resources):

A robust monitoring system is also key to improving weather and climate models and helps in the development of more accurate prediction, necessary for informed decision making at national, regional and global levels.

The investment on observing networks proposed here will greatly improve the situation in Mauritania.

[CR 12,13, 1412,13, 14, R] ***Has the sustainability of the project/programme outcomes been taken into account?***

The proposed activity is not a "one-off" intervention that will initiate a new set of interventions or small scale pilots that will only last for the life of the project. Rather this project will leave a lasting legacy as it builds on systems already in place, albeit currently deficient ones. Deficiencies in the Hydro-meteorological observing net work will be addressed by i) design of an optimal network to meet the data needs for severe weather forecasting and alerts in coastal areas and flooding in densely populated and economically important areas (during the full proposal development phase; ii) improving the human capacity of the National Meteorological Service and Hydrological Service to maintain the system and better utilise the expanded weather and climate data sets that will be available to them; and iii) an improved system of targeted information service delivery to other government ministries, economic sectors and the generally community will be put in place. The project will therefore build on foundations already in place for concrete and durable outcomes. The OMN will be the repository of the observational data which will be shared with neighbouring countries and the global community through the WMO Global Telecommunications Network (GTS)

Building on more than sixty years of international and regional cooperation facilitated through international programmes, WMO coordinates an operational network including, (i) a coordinated network of the National Meteorological and Hydrological Services (NMHSs) of its 189 Member States, (ii) the WMO Global Telecommunication Systems (GTS) which connects all countries through their NMHS, (iii) WMO Global Data Processing and Forecasting System (GDPFS) comprised of three Global Meteorological Centers (Australia, USA and Russia), over 50 accredited Global and Regional Specialized Meteorological Centers (RSMCs) with thematic or regional specialization, Regional Climate Centers (RCCs) and Drought Management Centers (DMCs), and (iv) a coordinated network of National Space Agencies and related centers (referred to as WMO-CGMS Virtual Centers). This system is shown schematically in Figure 2 above.

During the 1990s as part of its mandate, WMO facilitated negotiations for data exchange among its Member States and reached two resolutions (WMO Congress XII Resolution 40, and WMO Congress XIII Resolution 25) for exchange of "essential" meteorological data necessary for the provision of services in support of the protection of life, property and well-being of all nations.

Everyday the different national agencies within the WMO network gather and transmit massive amounts of real-time and near real-time data through WMO GTS to the network of RSMCs, who are "mandated" to develop and make accessible various global and regional forecast and analysis products and outputs based on latest tools and technologies. These are provided to the NMHS of the WMO Member states for further processing, analysis and downscaling for national applications. However, this cooperation depends on the national capacities to provide data and to be able to receive and utilize the regional products in their operations.

With the goal to further leverage capacities and resources and improve this network, over the last decade, WMO has been working on the WMO Integrated Global Observing System

(WIGOS) to address among many issues, interoperability of meteorological, hydrological, marine and climate related observing networks, which requires agreements on specifications, operational, technical, budgets and mandates of the various operators. Furthermore, given the importance of data availability, accessibility and exchanges within and among countries, WMO is working on the WMO Information System (WIS) (building on the WMO GTS) to address accessibility and availability of meteorological, hydrological, marine and climate data and information targeted at sectoral needs and applications.

WMO has facilitated the establishment of the Regional Climate Outlook Forums (RCOF) as multi-stakeholder mechanisms engaging national, regional and international climate experts, sectoral practitioners and policy makers. Through an interactive process, RCOFs and associated Regional Climate User Forums (i) develop consensus regional climate outlooks, (ii) identify the requirements for regional climate information products and services; and (iii) foster multi-disciplinary sectoral cooperation to improve the quality of climate information products and services. The West Africa RCOF is coordinated by ACMAD In collaboration with 18 National Meteorological Services (NMSs) : Benin, Burkina Faso, Cameroon, Cap Verde, Côte d'Ivoire, The Gambia , Ghana, Guinea Bissau, Guinea Conakry, Liberia, Mali, **Mauritania**, Niger, Chad, Nigeria, Senegal, Togo, Sierra Leone and the WMO Global Producing Centers of UK met Office, Météo-France, NOAA-IRI.

http://www.acmad.ne/fr/climat/presao13_updatefinal_juin_2011_fr.pdf .

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

The project will be coordinated by the WMO and implemented by ONM with the following project management structure:

A National Project Steering Committee: will be established under the coordination of La Cellule de Coordination du Programme National Changement Climatique (CCNPCC) and L`Office National Meteorologie comprising of representatives of the various Ministries and a representative from WMO. The primary role of this Steering Committee is to provide overall oversight, review the overall progress, financial aspects, address any major challenges and risks confronted, and provide guidance pertaining to identification of synergies and leveraging opportunities with relevant regional strategies, and other key development projects and initiatives in the region.

A National Project Executive Team: will be established at L`Office National Meteorologie (ONM) and chaired by the Director ONM. The Project Executive will guide the development and the implementation of the work plan. The Project Executive Committee will be composed of the Managers of the various relevant Sections in ONM. Primary responsibility of the Executive Committee is to facilitate the development of the project work plan, oversee its implementation, monitor progress and address coordination and cooperation issues at national and regional levels. The Project Executive Committee will meet monthly. In addition, it will regularly communicate via email and/or teleconference to share information on implementation progress by all the partners, to take joint decisions on implementation of activities, and corrective actions as needed.

A National Project Coordinator will be responsible for overall coordination across different segments of the work plan, development bi-annual Interim Progress Reports of Activities and

annual Activities and Financial Progress Reports for the Project Executive Committee and the Project Steering Committee.

WMO Secretariat: The Project will be supervised by the WMO Project Unit Manager and supported by a WMO Secretariat Project Team, comprised of designated staff from the WMO programmes that have significantly contributed to the design and will be supporting the implementation of the project. The WMO programmes include:

- World Weather Watch (WWW) Programme
- World Climate Programme (WCP)
- Tropical Cyclone Programme,
- Agricultural Meteorology Programme,
- Hydrology and Water Resources Programme (HWRP)
- Education and Training Programme (ETRP)
- Technical Cooperation Programme (TCOP)
- Regional Programme Office for Africa

The WMO Secretariat will support, i) execution of the different segments and activities of the project as per project work plan relevant to the different programmes, ii) servicing the workshops and meetings, iii) development of technical reports, (iv) addressing technical challenges and risks of the project with their respective network of experts and centres the region. A project website will be set up and maintained to make available all the reports, materials and concrete developments associated with all components of the project.

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

With consideration for the anticipated risks of the proposed project and building on the WMO Risk Management Policy, a Preliminary Project Risk Profile is presented in Table 3 below. This table links the overarching risks to the measures taken to minimize them to ensure the successful achievement of the project outcomes. Risk management is an ongoing process that must be pursued consistently, systematically and on an on-going basis. The overall Project Coordinator, Project Executive Committee and the Project Steering Committee are responsible to monitor and address all risks associated with the project throughout its lifecycle and keep a risk log. The risk log will be a "living" document and will be updated and revised annually following each Project Executive Committee meeting. Overall, the anticipated risks can be categorized into four areas, (1) Operational Risks, (2) Financial Risks, (3) Development Risks, and (4) Reputation Risks. Among these risks, three areas may be highlighted, including:

(i) *National Commitments and Institutional Risks:* There is a risk that stakeholder commitment may be weaker than initially claimed, especially, government ministries` commitment to cooperation. For example, there is a risk that a Ministry could unilaterally decide to limit or stop sharing information or participating. However, steps have been taken to reduce this risk. Along with ongoing efforts leading up to the design of the project and to develop supportive constituencies, a Memorandum of Understanding will be established with the various government Ministries to support relevant areas of cooperation. WMO will also sign a specific Implementation Agreements with the ONM to deepen the technical and operational cooperation. WMO guidelines and manuals and will be operationally practiced through this project. This framework has proven over the past decades to lead to strong buy-in at the technical and operational levels, which has in turn increased data provision and cooperation among stakeholders.

(ii) *Performance and project management risks*: among contributing risks are potentially unclear roles and responsibilities of different stakeholders at different levels, weak coordination of project among multi-stakeholders, weak monitoring and reporting on results, limited understanding of Financing Agency policies and procedures and weak communications. WMO has extensive experience in successfully planning, implementing, monitoring and evaluation of these types of projects and has performed similar projects in the last 4 years Africa and other sub-regions. Through a project management framework that engages all the relevant stakeholders at the right level of decision-making and operations, WMO will address various project management and policy issues. Furthermore, extensive consultations with the various Ministries and the directors and experts of WMO Technical Programmes have been conducted to develop the project logic model and its results to ensure a realistic approach. Throughout the project, WMO will work very closely with the Steering Committee of the Project CIDA and the Project management framework will ensure that project activities, progress, successes and lessons learned are communicated regularly to the various project management structures and stakeholders.

(iii) *Risk of recurrent and concurrent disasters and subsequent post-disaster setbacks* Should a significant disaster or chain of disasters happen with impacts on the beneficiary countries that causes one or more activities of this project to be delayed, the project is designed in such a way that activities' timeline can be reviewed and adjusted accordingly.

Table 3: Project Risk Profile

Criteria	**Very Low (1)**	**High (3)**	**Very High (4)**
Probability of Occurrence	Very unlikely	Likely	Very Likely
Potential impact on ability to meet objectives / deliver outcomes of the project	Standard procedures should be sufficient to address risk	Likely threat to outcomes – requires action and ongoing review	Definite threat to outcomes – requires mitigation actions and ongoing management

	Risk Definition	**Risk Level**	**Risk Response**
R 1 – Regional commitment and institutional risks	- There is also a risk that stakeholder commitment may be weaker than initially claimed, especially, governments' commitment to regional cooperation. For example, there is a risk that a	- Low (2)	- As part of the ongoing efforts leading up to the design of the project, efforts have been made to develop supportive constituencies within the Government of Mauritania and WMO - All Ministries have been consulted will be invited to participate in the Project Executive Committee - A Memorandum of Understanding will be established with the government to support relevant areas of cooperation. - As part of the preliminary assessments for the project we have established an

	Risk Definition	Risk Level	Risk Response
	country could unilaterally decide to limit or stop sharing information.) - Different capacities among Ministries leading to different priorities and capacities to benefit from services being developed.		understanding of capacities and challenges of the NMHS in the direct beneficiary country and as part of the design of the project, these issues are already addressed.
R 2 - Performance and project management	- Unclear roles and responsibilities of different stakeholders - Weak coordination of project among multi-stakeholders - Weak monitoring and reporting on results - -Limited understanding of Financing Agency policies and procedures - Weak communications strategy	- Low (2)	- WMO through its regional network ensures a field support at regional and national level, that will be critical for the project implementation. - WMO is highly competent in all areas of this project and has performed similar projects in various regions, and has extensive experience in successfully planning, implementing, monitoring and evaluation of these types of projects. - Project Management Framework involves: (1) Steering Committee, (2) Executive Committee, (3) A senior WMO Project Team leader in WMO (4) Overall Project Coordinator, (5) WMO Secretariat Project Team to address various project management and policy issues (see section 3.5). - Extensive consultations with ONM and experts of WMO Technical Programmes have been conducted to develop the project logic model and its results to ensure a realistic approach. However, certain aspects of the project, particularly pertaining to achieving regional agreements for data sharing would depend on the existing bilateral and multilateral agreements as well as interests and political issues in the region. In this respect, the project has been designed to facilitate this discussion towards reaching these agreements through systematic consultations with all stakeholders - The Project management framework will ensure that project activities, progress,

	Risk Definition	Risk Level	Risk Response
			successes and lessons learned are communicated regularly to the various project management structures and stakeholders.
R.3	- Inadequacy of funding - Improper financial control and oversight - Weaknesses in procurement and selection - Currency exchange	- **Low (2)**	- A trust fund will be established that will be managed by the Senior Project Team leader with support of the full time Project coordinator, under the supervision of WMO Resource Mobilisation Office and Resources Management Department - Management of funds will be the responsibility of the WMO following transparent and reliable financing procedures. Only specific and very limited funding for local costs may be channeled through national agencies for local costs of workshops and meetings. - WMO has established a very strong cooperation with its network of national agencies and regional partners over the years, and is fully aware of the local financial regulations, practices and procedures of its partners. - WMO follows UN Procedures for Financial Management, Audit and Reporting
R 4 Socio-political and policy risks	- Differences in socio-political conditions, political conflicts and economic atmosphere - National and Sectoral policies and planning on DRR and Climate Change Adaptation - Gender policy biases that limit women's participation	- **Low (2)**	- Continued political stability at national levels is a pre-condition for effective implementation of the project and sustainability of its results. Risk of political instability in the country is considered low to moderate. The risk to the project from political instability will be mitigated by an inclusive and transparent approach to implementation that will be open to all interested stakeholder groups, efforts to promote ownership of the project by targeted groups. - WMO has a gender inclusive policy that applies to all of its programmes and activities, equal opportunities principles and requirements have been considered in designing the project and will be thoroughly considered during its implementation.
R 5 Disasters caused by natural hazards	- Risk of recurrent and concurrent disasters and subsequent post-disaster setbacks	- **High (3)**	- Should a significant disaster or chain of disasters happen with impacts on the beneficiary country that causes one or more activities of this project to be delayed, the project is designed in such a way that

	Risk Definition	Risk Level	Risk Response
			activities' timeline can be reviewed and adjusted accordingly.
R 6	- International standing (multilateral and donors, bilateral partner institutions, and recipients and beneficiaries) - Inability to produce results.	- Low (2)	- WMO is globally recognized as the United Nations leader in weather, water and climate services - WMO has strong governance mechanisms supported by 189 Member States and six regional associations WMO has ensured a strong engagement of national and regional partners in this project from very early stage of the process.

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

Project monitoring and evaluation will be conducted in accordance with established WMO procedures. The Logical Framework for the project will provide performance and impact outcome level indicators along with their corresponding means of verification. These will form the basis on which the project's Monitoring and Evaluation system will be built. The Table below outlines the monitoring and evaluation activities and budget allocation.

Type of M&E Activity	Schedule	Responsibility	Total (USD)
Inception workshop	Within 1st month in 1st Year of Project	Project Coordinator WMO-ONM	3,000
Inception report	2nd month in the 1st Yr of Project	Project Coordinator WMO-ONM	0
Quarterly reports	Every quarter annually	Project Coordinator	0
Six monthly technical monitoring report	Every six months	Project Coordinator Local consultant	6,000
Meetings of National Project Executive Committee	Immediately following inception workshop and thereon every month	Project Coordinator	1,000
Meetings of Project Steering Committee	Immediately following inception workshop and thereon every six months	Coordinator	5,000
Mid-Term Evaluation	Half way through project implementation	Project Coordinator WMO-ONM Project External consultant	5,000
Final Project Evaluation	At end of Project	External consultant	5,000
Project Terminal Report	During last quarter of final year of project		5,000
TOTAL ESTIMATED M&E COSTS			30,000

D. Project Budget: Project Budget Summary by Outputs and main Activities

Overarching Goal: Reduce the vulnerability and increase the adaptive capacity of coastal communities in West Africa to climate change and variability through the establishment of a sustainable weather and climate early warning system for extreme weather				
Component	**Expected Outcome**	**Outputs**	**Activities**	**Financing (US)**
Component A				**1,000,000**
Institutional and Technical Capacity Development of the Meteorological Service of Mauritania:	Increased institutional capacity of ONM to deliver sector specific weather and climate services and contribute to socio-economic development and poverty alleviation.	Established Early Warning System Improved NMHS capacity in strategic and technical planning Enhanced strategic approach to client service within the ONM Improved Technical capacity Increased exposure and recognition of the ONM within national government enabling them to affect national policies concerning weather and climate	Leadership and Management Policy Training	100,000
			Technical Training (i.e. fellowships and workshops to improve technical knowledge in matters related to products generation and service delivery)	380,000
			Institutional Strengthening of Management Systems and Client Engagement	
			Implement Severe Weather Forecasting System and Early Warning System working with regional and global centres	300,000
			Develop more accurate weather and climate information products	120,000
			ONM working closely with national government ministries to ensure that value of products and services developed are fully recognized	
				100,000

Component	Expected Outcome	Outputs	Activities	Financing (US)
Component B				**1000000**
Improving the provision of Weather and Climate Services and Early Warnings for Severe Weather and Climate Events and related hazards (floods and storm surge) by the NMHS.	Reduced vulnerability and loss of life and property of coastal communities to weather and climate hazards	□ Defined suite of weather and climate products and services based on sector specific requirements □ Developed suite of sustainable user-defined products and services specifically for: - Weather hazards and safety at sea - Flood risks - Climate variability - Coastal Inundation □ Increased use of appropriate and effective channels of communication to deliver services to communities	□ Convene series of workshops to bring together end user communities and service providers to identify appropriate products products that meet their needs	250,000
	Increased resilience to climate variability through sensitisation and improved interaction between the service providers and the user communities		□ Weather and climate product generation and service delivery (Pilot and scale-up)	300,000
			□ Establishment of an IT platform to enable the effective dissemination of products	150,000
	Delivery of more accurate weather and climate forecasts and early warnings that meet end-user requirements		□ development of a feedback mechanism between customers and service provider with a view to establishing a culture for service	100,000
			Develop a monitoring and evaluation platform for continuous improvement of products and services	100,000
			Community Sensitization to available information products	100,000

Component	Expected Outcome	Outputs	Activities	Financing (US)
Component C				**1500000**
Improve Hydro-meteorological Observation Networks and related IT infrastructure for Data Management and Integration	Improved monitoring and predication of sever weather on coastal communities	Strengthened observation network at the national level	Rehabilitation of existing weather stations	250,000
		Improved NMHS capacity to manage and maintain observation networks	Purchase and installation of necessary weather monitoring systems (synoptic, ground water, marine climate and weather)	1,000,000
	Improved data management infrastructure to facilitate data collection, analysis, exchange and integration thereby improving the quality of products delivered to end-users	Strengthened IT infrastructure to enable the delivery of products and services	Provision of the necessary hardware and software requirements	150,000
		Established Virtual Private Network to facilitate the exchange of weather information both within and amongst participating countries	Integrate observations collected to be used for real-time weather monitoring and climate analysis	100,000
Project Execution Costs		**Output**	**Activities**	**345,000**
Project Management Unit at ONM	Effective Implementation of project	PMU established and operational	· Project staff	200,000
			· Procure office furniture, equipment and stationary	40,000
			· PMU operation costs	75,000
		Project monitoring and evaluation	· Details presented in Separate Section	30,000
Total Project / Programme Costs				**3,845,000**
Project / Programme Cycle Management Fee		Details presented in Separate Section		**326,825**
Amount of Financing Requested				**4,171,825**

Project Cycle Management Costs (WMO)		
Category	**Indicative Services Provided by WMO**	**Estimated Cost of Providing Services - USD**
Identification, Sourcing and Screening of Ideas	Provide information on substantive issues in adaptation associated with the purpose of the Adaptation Fund (AF).	***12,675***
	Verify soundness and potential eligibility of identified idea for AF.	
	Provide technical support and backstopping to write technically and operationally viable project/ programme.	
	Source technical expertise in line with the scope of the project/programme needs.	
Development & Preparation	Verify technical soundness, quality of preparation, and match with AF expectations	***45,000***
	Negotiate and obtain clearances by AF.	
	Respond to information requests, arrange revisions.	
Project Support and Implementation Cost	Provide technical and operational guidance project teams.	***269,150***
	Provide technical information as needed to facilitate implementation of project activities	
	Provide advisory services as required.	
	Provide support and oversight missions as necessary.	
	Provide technical monitoring, progress monitoring and evaluation, and validation and quality assurance throughout.	
	Support from WMO corporate systems.	
	Allocate and monitor Annual Spending Limits based on agreed work plans.	
	Receipt, allocation and reporting to the AFB of financial resources.	
	Oversight and monitoring of AF funds.	
	Return unspent funds to AF	
Total		***326,825***

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

The Project Performance Measurement Framework is provided in Annex 1. For each of the Components three-four indicators (quantitative and qualitative) have been identified. These indicators are preliminary and will be reviewed and updated by the Project Executive Committee during the first year of the project, based on the outcomes of the assessments and consultations with the various stakeholders.

1. ANNEX 1: RESULTS FRAMEWORK AND MONITORING

Mauritania: Weather and Climate EWS Project Results Framework

Project Development Objective (PDO): Reduce the vulnerability and increase the adaptive capacity of coastal communities in West Africa to climate change and variability through the establishment of a sustainable weather and climate early warning system for extreme weather

PDO Level Results Indicators*	Unit of Measure	Baseline	Cumulative Target Values			Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
			YR 1	YR 2	YR3				
Indicator one:: Increased accuracy and timelines of basic weather forecasts	Accuracy (%) of weather forecasts of 72 hours lead time	50-65%	No change	70%	85%	Annual	Based on internal reports of ONM, WMO	ONM, WMO	Accuracy of weather forecasts and warnings must be sufficient to achieve credibility with users
Indicator Two: Increased accuracy of river flow forecasts	Accuracy (%) of seasonal river flow forecasts	40-55%	No change	70%	85%	Annual	Based on internal reports of ONM, WMO Stakeholder feedback	ONM, WMO	Seasonal river forecast accuracy needed for credible water management decisions

PDO Level Results Indicators*	Unit of Measure	Baseline	Cumulative Target Values			Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
			YR 1	YR 2	YR3				
Indicator Three: Increased accuracy of storm surge forecasts	Accuracy (%) of coastal inundation forecasts	40-55%	No change	70%	85%	Annual	Based on internal reports of ONM, WMO Stakeholder feedback	ONM, WMO	Accuracy of forecasts and warnings must be sufficient to achieve credibility with users
Intermediate Result indicator one: Improved observations and data integration	Data received/ sent by each NHMS daily			Agreeing procedure on emergency situations warnings at regional levels		Annual	Based on ONM reports and	ONM RSMC, WMO	Volume of shared hydromet data
Intermediate Result indicator two: Increased access of ONM to NWP data and integration of information to increase timeliness,	Access and amount of high resolution remote sensing data	ONM has limited access to Global NWP and satellite data and analysis	No change	Upgrade satellite downlinks and communications links	NHMS's received high-volume satellite products and produce visualization products	Annual	Based on NHMS reports	ONM RSMC, WMO	Satellite data collection, imagery analysis and product generation produced in real time

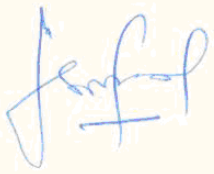
PDO Level Results Indicators*	Unit of Measure	Baseline	Cumulative Target Values			Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
			YR 1	YR 2	YR3				
quantity and quality of information needed to improve lead time and accuracy of forecasts		tools			for users				
Intermediate Result indicator Three: Better transmission of data to global telecommunication system (GTS)	% stations transmitted to GTS on time	86%	No change	Agreeing means and formats of exchange for new information products	95%	Annual	Based on internal reports of ONM and Global Centres	ONM WMO	WMO will provide statistics showing improved contribution of NHMS.
Intermediate Result Indicator Four: Increased institutional strength and sustainability of ONM	Concepts, regulations, operational guidelines, budgets, assessment of O&M needs	Existing legal structure, operating procedures and staffing are inadequate to meet	Develop concept for overall ONM development including potential "fee-for-service" arrangements	new operational guidelines developed in line with new concept, modernized observation infrastructure and technologies	regulations and operational guidelines fully functioning budget sufficient to cover O&M	Annual	Government decree or resolution, ONM reports	ONM	Regulatory documents Updated operational procedures Better match between budget needs and available resources

PDO Level Results Indicators*	Unit of Measure	Baseline	Cumulative Target Values			Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
			YR 1	YR 2	YR3				
		ONM mission's needs Investment and O&M needs far exceed ONM budget		"Fee-for-service" arrangements piloted in few sectors	needs of regular operations				
Intermediate Result Indicator Five: Increased reliability of climate data	Number of climate assessments	Current climate information is limited and inadequate quality	No change	Ability to downscale climate information to local scales for at least 50% of country	Ability to downscale climate information to local scales for at least 70% of country	Annual	Based on internal reports of ONM, WMO and Regional Climate Centre		Current capacity to understand climate change is limited by lack of key meteo observations. Restoration of network will improve reliability of long-range climate outlooks

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

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

A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT[13] *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

Ministère Délégué Aupres du Premier Ministre Chargé de l'Enironnement **Sidi Mohamed Ould El Wavi** **Charge de Mission (1er Conseiller du Ministre)** **Coordonnateur de la Cellule National Changement Climatique** **Rue 21 185 Ksar Nouakchott, Mauritanie** **Tel: +222 524 39 85** **Fax: +222 524 31 38**	Date: *Nouakchott? Le 12 juillet 2011* 

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*

[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.

بسم الله الرحمن الرحيم

République Islamique de Mauritanie
Honneur - Fraternité - Justice
Ministère Délégué auprès du Premier Ministre Chargé de l'Environnement et du Développement Durable

الجمهورية الإسلامية الموريتانية
شرف - إخاء - عدل
الوزارة المنتدبة لدى الوزير الأول
المكلفة بالبيئة والتنمية المستديمة

N° 0050 / MDAPMCEDD/CM

Nouakchott, le 21 JUIL 2011 نواكشوط في

Le Chargé de Mission

المكلف بمهمة

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN G6-602
Washington, DC. 20433
U.S.A
Email: secretariat@adaptation-fund.org

Endorsement: **COASTAL WEATHER AND CLIMATE HAZARD EARLY WARNING SYSTEM (CWCHEWS) FOR MAURITANIA**

Greeting to the Adaptation Fund Board from the Government of Mauritania.

As the Designated Authority for the Adaptation Fund within the Government of Mauritania I wish to confirm that the above titled project is in accordance with Mauritania's National Action Plan for Adaptation (NAPA): National Communication: Strategic Framework for the Fight against Poverty (PRSP): The Sustainable Development Strategy (NSDS): The Millennium Development Goals (MDGs) and the Global framework for Climate Services (GFCS) – National Elements.

I am therefore pleased to formally endorse the above AF project to be implemented in Mauritania through the World Meteorological Organisation as the Multi-lateral Implementing Entity and the Office National de la Meteorologie as the National Executing Agency.

On behalf of the Government of Mauritania, may I take this opportunity to thank the Adaptation Fund Board for considering our proposal and supporting our adaptation efforts thorugh this project.

Sidi Mohamed Ould El Wavi
Ministère Délègue Auprès du Premier Ministre Charge de l'Environnement,Coordonnateur de la Cellule National Changement Climatique, Rue 21 185 Ksar
Nouakchott, Mauritania

M.D.A.P.M.C.E.D.D
الوزارة المنتدبة لدى الوزير الأول المكلفة بالبيئة والتنمية المستديمة
المكلف بمهمة
Le Chargé de Mission

ص ب 170 – هاتف: 85 39 24 45 (222) + فاكس 38 31 45 24 (222) شارع 21-185 رقم 834 لكصر انواكشوط – موريتانيا
BP. 170 – Tél : + (222) 45 24 39 85 – Fax : + (222) 45 24 31 38 –Rue 21-185 N° 834 - Nouakchott – Mauritanie

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 (***The National Action Plan for Adaptation (NAPA): National Communication: Strategic Framework for the Fight against Poverty (PRSP): The Sustainable Development Strategy (NSDS): The Millennium Development Goals (MDGs): The Global framework for Climate Services (GFCS).*** and subject to the approval by the Adaptation Fund Board, understands that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.
Mary Power *Director Resource Mobilization* *World Meteorological Organization* *Name & Signature* Implementing Entity Coordinator

Date: 13 / 07 /11	Tel. and email: MPower@mo.int +41 22 730 8003
Project Contact Person: As above	
Tel. And Email: As above	

ANNEX 1

WMO Severe Weather Forecasting Demonstration Project (SWFDP)

Overall Framework

1. Introduction

With the ever-increasing precision, reliability and lead-time provided by numerical weather prediction (NWP) systems, for weather forecasting and the provision of meteorological services, they have also become a very relevant component of routine and severe weather forecasting processes at National Meteorological and Hydrological Services.

The Severe Weather Forecasting Demonstration Project (SWFDP) is an initiative to further explore and enhance the use of outputs of existing NWP systems, including ensemble prediction systems (EPS). Its aim is to contribute to capacity-building and to help developing countries in particular to have available and implement the best possible use of existing NWP products for improving warnings of hazardous weather conditions and weather-related hazards. Global-scale products, as well as data and information provided by other regional centres, are integrated and synthesized by a designated Regional Specialized Meteorological Centre (RSMC), which, in turn, provides daily guidance for short-range (days 1 and 2) and medium-range (out to day-5) on specified hazardous phenomena (e.g. heavy rain, damaging waves, etc) to participating National Meteorological Centres of the region. This is a "Cascading" concept of the forecasting process.

The SWFDP has successfully improved severe weather forecasting through improved access to, and more effective use of outputs of numerical weather prediction systems for weather forecasters, who in turn have improved the delivery of warning services. The SWFDP represents a systematic and practical approach for building capacity, and for transferring new knowledge and skills. Several demonstration projects are now in progress. The first regional project, which started in 2006, is being expanded to include all 16 countries of southern Africa and to span all seasons and a number of meteorological and related hazards (heavy rain, strong winds, large waves, cold temperatures, etc.). A second project is being implemented for the South Pacific Islands, which addresses heavy rains, strong winds, and damaging waves. The East Africa-Lake Victoria SWFDP commenced in 2010.

2. SWFDP project framework

The general principles which guide the planning and implementation of SWFDP regional projects have been established by WMO's Commission for Basic Systems (CBS), within the work programme of the OPAG on Data-Processing and Forecasting, in collaboration with the Public Weather Services (Programme). CBS has established a Steering Group for the SWFDP, which has developed two guiding documents: "SWFDP Overall Project Plan" and the "SWFDP Guidebook on Planning Regional Subprojects". These two documents have been maintained as experience has been gained though the regional projects, and are made available to this meeting of the SWFDDP – RA V Regional Subproject Management Team (RSMT).

3 Brief history, to now

The first realization of the Severe Weather Forecasting Demonstration Project was implemented at the beginning of the rainy season in south-eastern Africa in November 2006. RSMC Pretoria (South Africa) is the integrating regional centre for the global-scale products

provided by the European Centre for Medium-Range Weather Forecasts (ECMWF), the Met Office, UK, the National Centres for Environmental Prediction (NCEP, USA), as well as other information from RSMC La Réunion (France) specializing in tropical cyclones in the Indian Ocean, and RSMC Pretoria's own NWP production system, such as a limited area NWP system (UM SA12), and satellite data products (e.g. METEOSat MSG). In addition five National Meteorological Centres participated, including those of Botswana, Madagascar, Mozambique, Tanzania and Zimbabwe. A Regional Subproject Management Team was established to manage the project implementation.

Training workshops were conducted, targeting weather forecasters of the region who were carrying out the project's implementation. While the demonstration phase ended in November 2007, and was fully evaluated, the project's framework was maintained and the SWFDP continued to reap benefit for the participating NMHSs. Regular reports of the experiences of the participating countries in the SWFDP have been extremely positive. The goals of the project of improved weather forecasting and warning service programmes are being significantly realized, including for example, longer lead-times for alerting the public and national and regional civil protection agencies, and improved cooperation between NMHSs with their civil protection agencies. Some deficiencies have also been identified, such as tools for forecasting the rapid onset of localized severe thunderstorms.

Southern Africa

In southern Africa the expansion of the initial project was launched in November 2009. In February 2009, the project's Regional Technical Implementation Team was established and met with the principal objective to agree on the project's Implementation Plan, including to carry out three projects to focus on weather warnings: verification, exchange, and soliciting public feedback. Significant improvements to the forecasting and warning programmes including the delivery of warning services were realized by the newly joined NMHSs.

South Pacific Islands

The second SWFDP regional subproject, entitled "Severe Weather Forecasting and Disaster Risk Reduction Demonstration Project" (SWFDDP), has commenced its Pilot Phase for the South Pacific Islands (RA V), focused on heavy rain, strong winds, and damaging waves for four Island States: Fiji, Samoa, Solomon Islands, and Vanuatu, with the central RSMC role for the project undertaken by RSMC Wellington, while RSMC Nadi (Fiji) and RSMC Darwin (Australia) are enhancing their existing regional forecasting functions. Global scale numerical weather prediction guidance products are provided by the Met Office (UK), NCEP (USA), and ECMWF.

The full demonstration phase is planned to commence in November 2010, when as many as an additional five Small Island States could participate. In addition to PWS and DRR, collaboration was established with TCP, MMO and WWRP programmes to properly address the technical aspects of tropical cyclones and marine-related hazards, such as damaging waves and storm surges.

Southeast Asia

Following the recommendation by the WMO Fifteenth Congress (May 2007), other possible regional projects are being considered, including for example, in southeast Asia, which was the subject of a DPFS- and PWS-led workshop (Ha Noi, Viet Nam, February 2010) to explore the region's needs of and possible benefits from a SWFDP project for Cambodia, People's Democratic Republic of Lao, Thailand, and Viet Nam. The workshop has recommended that the project could focus on various hazards associated with tropical cyclones, especially heavy precipitation due to various meteorological events of the region,

while also developing the capacity of the National Hydro-Meteorological Centre of Ha Noi, Viet Nam as a sub-regional centre, with the assistance of the Hong Kong Observatory. Global products could be provided by CMA, JMA, KMA, Hong Kong Observatory, and Viet Nam. It is envisioned that this project could commence the demonstration in June 2011, allowing the interim period for project development and planning.

Eastern Africa

Other projects are being considered in RA I, including one for Eastern Africa, which was the subject of a DPFS-, PWS and AgM-led workshop (Nairobi, Kenya, October 2010) to explore the region's needs of and possible benefits from an SWFDP project. This project would focus on severe weather forecasting and warning services for the benefit of the general public and socio-economic sectors, in particular agriculture and fisheries. The beneficiaries would be countries in Eastern Africa, bordering on Lake Victoria (United Republic of Tanzania, Kenya and Uganda) and other surrounding countries, including Rwanda, Burundi and Ethiopia. It is envisioned that this project could commence the demonstration in mid-2011, allowing the interim period for project development and planning.

Integrated Flood Management: A new approach

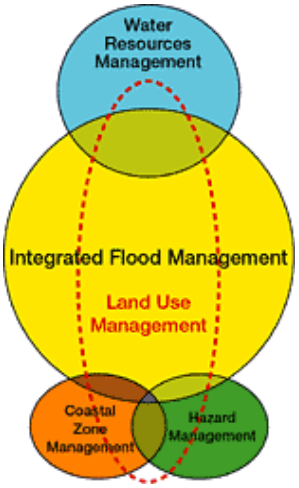
There is a need for an approach to flood management that improves the functioning of the river basin as a whole, recognizing that floods have beneficial impacts and can never be fully controlled. Such an approach seeks to maximize the net benefits from the use of floodplains and to minimize loss of life, subordinating flood loss reduction to the overall goal of maximizing the efficient use of the floodplain. Therefore,

Integrated Flood Management (IFM) is a process that promotes an integrated, rather than fragmented, approach to flood management. It integrates land and water resources development in a river basin, within the context of Integrated Water Resources Management (IWRM), with a view to maximizing the efficient use of floodplains and to minimizing loss of life.

Elements of Integrated Flood Management:

Manage the Water Cycle as a Whole

- Flood management plans should include drought management, and should take measures to maximize the positive aspects of floods such as by retaining part of flood flows for use in crop production.
- IFM recognizes the need to manage all floods and not just those floods up to some design standard of protection. Flood plans must consider what will happen when a flood more extreme than the design standard flood occurs, and must foresee how such a flood will be managed.
- Urban flood plans must manage both stormwater quantity and the effects of storm water on water quality.



Integrate Land and Water Management

- Land-use planning and water management should be combined in one synthesized plan with a certain common field, such as the mapping of flood hazards and risks, to enable the sharing of information between land-use planning and water management authorities.
- Flood management needs to recognize, understand and account for linkages between upstream and downstream in order to realize synergies in improving river basin performance.

Manage Risk and Uncertainty

- Flood risks are related to hydrological uncertainties which are subordinate to social, economic and political uncertainties: the biggest and most unpredictable changes are expected to result from population growth and economic activity.
- Flood risk management consists of systematic actions in a cycle of preparedness, response and recovery, and should form a part of IWRM.
- Risk management calls for identification, assessment, and minimization of risk, or elimination of unacceptable risks through appropriate policies and practices.

Adopt a Best-Mix of Strategies

- Flood management plans should adopt strategies that are flexible, resilient and adaptable to changing conditions.
- Successful IFM looks at the situation as a whole, compares the available options and selects a strategy or a combination of strategies that is most appropriate to a particular situation.
- Flood management plans need to include both long-term and short-term interventions.

Ensure a Participatory Approach

- IFM should encourage the participation of users, planners and policy-makers at all levels and should be open, transparent, inclusive and communicative; this requires the decentralization of decision-making, and includes public consultation and the involvement of stakeholders in planning and implementation.
- IFM has to keep gender, religious and culture differences in perspective.
- It is important to make use of strengths of both "bottom-up" approach and "top-down" approach in determining the appropriate mix.
- River basin committees or organizations, at basin or sub-basin levels, can provide appropriate forums for such coordination and cooperation across functional and administrative boundaries.

Adopt Integrated Hazard Management Approaches

- A holistic approach to emergency planning and management is preferable to a hazard-specific approach, and IFM should be part of a wider risk management system.
- Integrated Hazard Management Approach consequently ensures consistency in approaches to natural hazard management in all relevant national or local plans.
- Early warnings and forecasts are key links to the series of steps required to reduce the social and economic impact of all natural hazards, including floods

See http://www.apfm.info/pdf/concept_paper_e.pdf