



NATIONAL ADAPTATION PROGRAMMES OF ACTION

Summary of Projects on Early Warning and Disaster Management identified in Submitted NAPAs as of September 2008

COUNTRY	PROJECT TITLE	PAGE NUMBER
Bhutan	Disaster Management Strategy – planning for food security and emergency medicine to vulnerable communities	3
Bhutan	Weather Forecasting System to Serve Farmers and Agriculture	6
Bhutan	GLOF Hazard Zoning (Pilot Scheme – Chamkhar Chu Basin)	10
Bhutan	Installation of Early Warning System on Pho Chu Basin	12
Burkina Faso	Mitigating vulnerability to Climate Changes through the strengthening of a prevention and food crisis management system.	15
Burundi	Improvement of seasonal early warning climate forecasts	20
Cambodia	Strengthening of Community Disaster Preparedness and Response Capacity	22
Central African Republic	Implementation of an early warning and prevention system/Mitigation of harmful effects of abrupt climate change in local communities in RCA	24
Comoros	Setting of an early warning and surveillance system on situation of climatic risks	27
Ethiopia	Strengthening/enhancing drought and flood early warning systems in Ethiopia	29
Gambia	Rehabilitation of Early Warning Systems on Climate Related Natural Hazards	31
Guinea	Promoting adaptation-oriented technologies 5 Implementation of a system of early warning climate forecasts to protect agricultural production	34
Guinea Bissau	Prevention of Natural Catastrophes Project	36
Guinea Bissau	Integrated System of Information on Food Security Project (SISA)	38
Kiribati	Upgrading of meteorological services	40

Lesotho	Improvement of an Early Warning System Against Climate Induced Disasters and Hazards	42
Liberia	Improved Monitoring of Climate Change: Enhance adaptive capacity through the rebuilding of the national hydro-meteorological monitoring system and improved networking for the measurement of climatic parameters	44
Madagascar	Implementation of simple structure and/or capacity building plan for the decentralized Meteorological service	46
Malawi	Improving Malawi's preparedness to cope with droughts and floods	48
Malawi	Improving climate monitoring to enhance Malawi's early warning capability and decision making and sustainable utilization of Lake Malawi and lakeshore areas resources	52
Mozambique	Strengthening of early warning system	57
Niger	Producing and disseminating meteorological data	62
Samoa	Climate Early Warning System Project	65
Sao Tome e Principe	Establishing a system of climate alert	68
Sierra Leone	Develop an Early Warning System in Sierra Leone	70
Sierra Leone	Establishment of a National Sea-Level Observing System for Sierra Leone	73
Solomon Islands	Climate change adaptation on low lying and artificially built-up islands	75
Tuvalu	Strengthening Community Disaster Preparedness and Response Potential.	78
Uganda	Strengthening Meteorological Services	80
Zambia	Strengthening of early warning systems to improve services to preparedness and adaptation to climate change	82

BHUTAN

NAPA PRIORITY PROJECT NO. 1

DISASTER MANAGEMENT STRATEGY- PLANNING FOR FOOD SECURITY AND EMERGENCY MEDICINE TO VULNERABLE COMMUNITIES.

RATIONALE

In times of disasters due to landslides, flood, drought and other forms of natural disaster, it is not only human lives that are endangered as an immediate impact of the hazard, but more often how well relief efforts are coordinated that determine the success or failures in managing disasters.

A well managed relief strategy will not only require a rapid response team in health services with the capacity to institute effective Emergency Medicine and First Aid, but also a well planned food reserve and distribution network to operate efficiently for at least six months.

For example the climate related disasters of the six eastern Dzongkhags in 2004 witnessed major loss of lives, damage to properties and houses, loss of over 660 acres of agriculture land, and loss of standing crops for over 1430 households.

Infrastructure such as irrigation channels, power transmission facilities, bridges, farm and feeder roads were significantly damaged.

In order to cope with such vulnerabilities from climate change impacts, it is imperative to establish both a network of food reserve stocks in key areas of eastern Bhutan with an efficient distribution system to cover a minimum of six months period; and an emergency medicine and first aid to cater to the vulnerable groups.

DESCRIPTION

Objectives

The objective of the project is to plan and implement components of the national disaster management strategy as concerns emergency food security, medicines and first aid in few pilot districts in eastern Bhutan.

Activities

- Mapping of vulnerable areas of potential land slide and floods in the vicinity of settlements
- Identification of potential areas for resettlement of villages
- Put in place a National Disaster Management Strategy
- Formulation of National Emergency Medical Services Strategy at National as well as Dzongkhag level
- Consolidating and strengthening institutional arrangements at national and local levels – for example creation of rapid response for food distribution and medical teams at all levels
- Training of Emergency Medical Teams (EMTs) in country
- Procurement of equipment – ambulance, communication sets, equipment, First Aid Kits, EMT Uniform, teaching materials
- Introduction of EMS in pre-service curriculum at Royal Institute of Health Sciences (RIHS)

Inputs

Inputs include technical and financial assistance, equipments and institutional support.

Short term outputs

- Information on cause-effect relation on physical changes caused by various factors such as population pressure, deforestation, over-grazing, intentional forest fires and poor land management is available;
- A national disaster management strategy policy and strategy in place;
- Immediate response to any disasters;
- Many lives saved due to immediate medical intervention;
- Enough human resource trained in managing disasters.

Long term out puts

- A rapid food distribution system to cover a minimum of six months period in any given situation in place facilitated through a network of food reserve stocks in different parts of the country;
- Clear policy directives and institution of functional support and management structures established;
- Well-defined operational plans and systematic implementation strategies established;
- The health sector emergency plan closely linked with the other national disaster plans which will/may be put into operation by the Royal Government ;
- Functional Trauma centers strengthened and established;
- Health Department in collaboration with the Dzongkhag health sectors ensures a heightened level of preparations in order to respond optimally for any disaster situation;
- Adequate community understanding and participation sought so that there is critical support in terms of providing physical support and blood donations;
- Institutional arrangements at national and local levels in place for rapid response for food distribution and medical services in case of natural disasters through climate change.

IMPLEMENTATION

Institutional arrangements

The project will be implemented by the Ministry of Home and Cultural Affairs in partnership with Ministry of Agriculture, Ministry of Health and other stakeholders such as the Ministry of Works and Human Settlement, Dzongkhag (Local) Administrations and relevant communities.

Risks and barriers

There are no major risks foreseen in the implementation of the project.

Monitoring and evaluation

Monitoring and evaluation of the project will be carried out as per the normal RGOB procedure.

COST

The project cost is estimated at USD 620,000

Budget breakdown

Activities	Year 1 (USD)	Year 2 (USD)	Year3 (USD)
A. Food security			
Survey and data collection for the study on cause and effect of physical changes caused by various factors such as population pressure, deforestation, overgrazing, intentional forest fires and poor land management	23 255	-	-
Draft report and workshops on the above study, publication	-	18 600	-
Formulation of a national disaster management strategy and policy (workshops and seminars)	-	14 000	-
Institutional support to MoHCA and MoA for emergency disaster management	-	-	23 255
Subtotal	23 255	32 600	23 255
B. Emergency medical			
Formulation of National Emergency Medical Services Strategy - consultative workshop	10 000	10 000	-
Training of Emergency Medical Teams (EMTs) in country	30 000	30 000	-
Training of Medical Doctors & Nurses on Trauma Management in country	20 000	20 000	-
Training of Trainers (TOT) on EMS	30 000	30 000	-
Observation Tours to other centers in the region	25 000	25 000	-
Strengthening the 3 Trauma Centres	60 000	60 000	-
Training of Ambulance drivers on basic first aid	5 000	5 000	-
Strengthen the medical rehabilitation center at Gidakom	30 000	30 000	-
Procurement of logistics – ambulance, communication sets, equipment, EMT & First Aid Kits, EMT Uniform, teaching materials	60 000	60 000	-
Sub-total	270 000	270 000	-
Total (A+B)			619 110

BHUTAN

NAPA PRIORITY PROJECT NO. 3

WEATHER FORECASTING SYSTEM TO SERVE FARMERS AND AGRICULTURE

RATIONALE

Agriculture depends on the mean climate of a particular region. Each production unit of agriculture has its own climate requirement for growth and development; and any large-scale deviation exerts a negative influence. Extreme climate conditions also negatively impact agricultural production through the development of pests and diseases. Although natural disasters resulting from climatic extremes cannot be averted, their destructive impacts in terms of losses in production and productivity can be greatly minimized. Planning and management for adaptation, prevention and mitigation of extreme events are crucial for the safety and well-being of the vulnerable communities who live in disaster-prone areas.

Accurate and timely information on extreme meteorological events is critical to farmers in maximizing their production by making appropriate decisions in their production environment, setting up protective mechanisms and scheduling inputs and activities effectively. The successful development of Bhutan's agricultural economy is, therefore highly dependent on the use of climatic and synoptic weather information, particularly on adverse meteorological factors. Such information can be used in the development of proactive and responsive adaptation strategies that can minimize the adverse impacts of extreme climate conditions.

Agriculture in Bhutan is completely dependent on the prevailing weather conditions determined largely by the influences of high Himalayas and the South-west Monsoon circulation. Notwithstanding the magnitude and spatial characteristics of the system, even a slight deviation in the monsoon onset and retreat can result in significant changes in agricultural productivity. Without the capacity to monitor and understand the dynamics of these weather manifestations, efforts to modernize and sustain agriculture for national food security and as a rural economic sector will not bring about expected returns. Delayed monsoon may result in agricultural drought while an early one may hinder production activities and favour development of pests and diseases. For example temperature extremes, especially at the beginning of the growing season, may destroy the production of an apple orchard for the whole year.

A weather detection, monitoring and early warning system can provide reliable and timely information to the farmers to deal with weather and climatic variability and changes. Seasonal forecasts can support long-range, strategic decisions; while weather forecasts can support short-term, tactical decisions in the agricultural production operations. Special weather forecasts provide the input to assist farmers in making decisions on planting/sowing, application of crop protection chemicals, forestry and forest fire operations, product transportation, and post-harvest operations.

Bhutan, to date, does not have a proper weather or climate forecasting capability. The global forecasts provided by outside systems do not serve the needs of agriculture development in Bhutan as they cannot resolve the geophysical complexity associated with the rugged terrain. Building up the communication and computing resources together with the development of technological competence of meteorological

technicians and professionals will enable Bhutan to operationalize its own forecasting and early warning system that accounts for its complex forcing systems. The forecasts will be more accurate with more frequent updates at higher spatial and temporal resolutions. In addition, the weather forecast can be customized to produce agro-meteorological data for the Ministry of Agriculture and its stakeholders.

DESCRIPTION

Objectives

- To set up a weather forecasting office (WFO) with necessary equipment and manpower to provide weather and seasonal forecasts for supporting production decisions of the farmers;
- To provide an agro-meteorological early warning system against inclement weather conditions and provide special advisories at different production stages.

Activities

1. Institutional setup with necessary mandate and program policy and development support;
2. Procurement of tools and equipments to fulfil the communication and computing resource needs;
3. Set up one automated and telemetered synoptic station in each Dzongkhag;
4. Link up to the Global Telecommunication System (GTS) of the WMO to receive regular synoptic data;
5. Install a limited area weather model, such as WRF or MM5 to operationalize a computer-based weather forecasting system;
6. Set up a data assimilation system to ingest observational and satellite data to improve the accuracy of model data;
7. Establish Internet link to the global model data providers for initial and boundary conditions input to the mesoscale LAM model configured for Bhutan's conditions;
8. Set up a data processing and dissemination system;
9. Train technicians and professionals in data compilation, processing and preparing weather forecasts;
10. Train professionals in running and maintenance of the forecast models, postprocessing and development of information products/packages;
11. Train farmers and extension workers in the proper use of the information products and advisories;
12. Forecast verification in association with other WFOs in the region.

Inputs

The main inputs include: professional expertise (TA), enabling policy environment, computer hardware and software, synoptic stations, dedicated internet access, training, human resources, finances, administrative and management support. Information and data input includes global/regional forecast and analysis data, satellite data, GTS data, local synoptic data.

Outputs

- An independent weather forecasting office (WFO) established;
- An optimally distributed network of synoptic stations;
- An operational mesoscale LAM model optimized for Bhutan;

- More accurate weather forecasts up to 15 days;
- Seasonal forecasts for the next three months;
- Forecast guidance materials;
- Regular agro-meteorological advisories;
- Special advisories;
- Internet resources including manuals, guidelines, maps, etc.

Long-term outputs

These include, among others

- Higher agricultural productivity;
- Better working conditions;
- Enhanced food security and standard of living;
- Better use of natural resources;
- Reduced damage to the environment.

IMPLEMENTATION

Institutional arrangements

The Ministry of Agriculture shall implement the project with the establishment of a new WFO under it. The synoptic stations in the Dzongkhags will report at three hourly intervals. The information will be uplinked to the GTS and downlink synoptic observations from others by the central data communication system located at the WFO in Thimphu. The model forecast will run once a day assimilating the latest analysis and forecast boundary conditions. The forecasts and advisories will be available within three hours of the completion of model run.

Risks and barriers

- No government approval to establish the weather forecast office;
- Failure in data uplinks and downlinks;
- Internet connection breakdown;
- Instrument and equipment breakdown;
- Insufficient, inadequate or no provision for training of the technicians and scientists;
- Failure to appreciate the economic value of weather services by the Government, research & development workers, and the farmers;
- Failure to educate the beneficiaries on the prudent use of weather information and advisories.

Monitoring and evaluation

Monitoring and evaluation will be done by the MOA via its established procedures:

- Annual progress report and half-yearly financial report;
- Technical and forecast verification report;
- Survey report of the target beneficiaries;
- Socio-economic impact assessment.

COST

<i>USD 420,000</i>

Budget breakdown

Activities	Year 1 (USD)	Year 2 (USD)	Year 3 (USD)
Installation of 20 synoptic stations	200 000	-	-
Set up operational weather model	50 000	10 000	15 000
Information post processing	5 000	5 000	5 000
Development of Advisories	5 000	5 000	5 000
Information Dissemination	5 000	5 000	5 000
Short-term training	50 000	10 000	10 000
Workshops and seminars	10 000	10 000	10 000
Total Project Cost	325 000	45 000	50 000

BHUTAN

NAPA PRIORITY PROJECT NO. 7

GLOF HAZARD ZONING (PILOT SCHEME - CHAMKHAR CHU BASIN)

RATIONALE

The Chamkhar Chu River has its source from the glaciers of Gangkar Punsum and the Monla Karchung ranges; a total of 557 glacial lakes have been identified in the Chamkhar Chu Sub-basin with a total glacial lake area of 21.03 sq.km. The whole of Bumthang district is drained by the Chamkhar Chu which flows south towards Zhemgang district to join the Mangdhe chu forming the mighty Manas river. The valley of Jakar today is a key tourist destination both for local Bhutanese as well as for foreign visitors and tourists. The local businesses, hotels, shops, and several cottage industries have steadily increased over the years making it a prosperous district. To the outside world Bumthang is one of the most important Buddhist pilgrimage destinations in the Himalayas as the valley boasts numerous historical monuments, temples, monasteries, and religious sites. Only recently plans have been approved for the town of Chamkhar to be shifted to Dekiling; as with many other areas in the valley this is being done without a proper consideration of GLOF threats. Hazard zonation at this critical stage in the valleys development would prove crucial in the long run, as the valley would be better prepared in the event of a GLOF.

DESCRIPTION

Objectives

The main objective of this project is to prepare a hazard zonation map for GLOF (from Khaktang to Chamkhar town) where the main settlements and developmental activities are taking place at present.

Activities

- Collection of different data set from the field (including data on the existing glaciers and glacial lakes at the headwater), which mainly involves extensive field works
- Comparison of similar works in other regions where similar threat exist and adopt the best suited one for our area
- Acquiring materials for remote sensing works in places of no accessible areas

Inputs

The main inputs in this project includes financial resources, research materials including equipments, human resources and office equipments (computers and accessories) and software for data analysis (like GIS and remote sensing related software).

Short term outputs

- Adopting appropriate methodology for such works that best suits the area;
- Trained staff for handling the equipments and associated software;
- Creating awareness among the people who are settled along the course of this river;
- High quality hazard zonation map delineating areas with high risk, medium risk and low risk area;

- Material for public awareness campaign.

IMPLEMENTATION

Institutional arrangements

The Department of Geology and Mines (DGM) the Ministry of Trade and Industry will be the implementing agent from the Royal Government of Bhutan's side. DGM will work in close consultation with the Ministry of Agriculture, Department of Energy, Department of Local Governance under Ministry of Home and Cultural Affairs and the respective districts.

The main focus will be given at the communities of the area and their participation will be an important part of this project.

Risks and barriers

The main risk will be the lack of local participation from the area.

Monitoring and evaluation

Monitoring will be done by the Department of Geology and Mines and the project steering committee will be formed which will evaluate the performance on either quarterly or 6 months basis through meetings.

COST

The project is estimated to cost about USD 0.232 million

Budget breakdown

Activities	Year 1 (USD)	Year 2 (USD)
Field activities (Data Collection on Geotechnical, Geology, Geophysical, Topographical Survey, etc.)	-	38 749.99
Communication: vehicle hiring charges, telephone, internet and postal charges	-	27 272.72
Capacity Building (human resource development and infrastructure capacity development)	84 884.25	56 586.16
Workshops and meetings to review project progress and disseminate project outcomes including publication of final report	10 000	15 000
Total		232 493.12

BHUTAN

NAPA PRIORITY PROJECT NO. 8

INSTALLATION OF EARLY WARNING SYSTEMS ON THE PHO-CHU RIVER BASIN

RATIONALE

In living memory there have been several cases of GLOFs in Bhutan. The first studies on glaciers were done in 1960s. There are an estimated 2,674 glacial lakes in Bhutan out of which 562 are associated with glaciers¹; the latest studies show 24 glacial lakes to be potentially dangerous; not until 1994 GLOF was the dangers taken seriously; the main rivers in Bhutan: Mo Chu, Pho Chu, Mangde Chu, Chamkhar Chu, Kuri Chu and Pa Chu originate from the glaciers and glacial lakes of the Higher Himalayas. It is known that in the last few decades there has been a rapid retreat of glaciers creating many moraine dammed lakes that are increasing in size at a fast rate. Glaciers in Bhutan have been recorded to be retreating at about 20-30m a year mainly attributing to global warming trends.

The 1957 GLOF affected the Punakha-Wangdi valley which destroyed a section of the Punakha dzong; this was caused by the glacial lake outburst from the Tarina Tsho lake in western Lunana. The second flooding that lasted for 5 days- from the same lake in eastern Lunana region again destroyed parts of Punakha dzong. The most recent flood occurred on 7th October 1994 from the partial burst of the Luge Tsho in eastern Lunana; this flood caused loss of life and extensive damage to property along the Punakha- Wangdi valley; the Dzongchu or small dzong was partly destroyed when the Pho chu and Mochu (male and female) rivers joined course above the dzong. A total 91 households were affected by the flood in the Lunana Region. Records show: 12 houses being damaged, 5 water mills washed away and about 816 acres of dry land damaged or covered with silt and sand; 965 acres of pasture land was damaged and covered with sand and silt, 16 yaks were carried away and about 16 tonnes of food grains lost.

A recent study² warns of hazard potential of Raphstreng and Thorthormi glaciers and its lakes could become dangerous (as the Luggye 1994 GLOF) in about a decades time (around 2010), unless mitigation measures are taken.

DESCRIPTION

Objective

The main objective is to install a flood warning station on the Pho-chu river basin- specifically above Samdingkha (15-20 km above Punakha) so that Punakha can be warned within about ten minutes of a GLOF.

Activities

- Compare similar work already done in comparative area or region (Nepal, South Tyrolean- Austrian/Swiss hazard zonation plans could be adapted to Bhutanese conditions;

¹ ICIMOD (2001), Bhutan. Inventory of Glaciers, Glacial Lakes, and Glacial Lake Outburst Floods. Monitoring and Early Warning Systems in the Hindu Kush-Himalayan Region

² Dept. of Geology and Mines with Institute of Geology, University of Vienna, Austria, August 2002

- Mapping the Pho-chu area according to geological, geotechnical and hydrogeological aspects and analyzing soil samples;
- Measuring the area of investigation to calculate flood wave spreading, slope stability and river erosions;
- Working out the sound plan- acoustic warning system according to natural sound level, morphology, damping and weather conditions;
- Projecting the warning system which will include three components: releasing mechanism, connection to the acoustic warning device and determining the location for the acoustic warning devices;
- Construction of a robust water level in the Pho-chu valley;
- Constructing and commissioning the warning system.

Inputs

The main inputs include human and financial resources, small equipment, vehicles, computers and accessories.

Short-term outputs

- Brief comparative reports of similar systems established in Nepal, Swiss/Austrian situations;
- Flood and hazard zonation maps of Pho-chu valley;
- Early warning systems in place;
- Staff trained to operate and maintain EW system;
- Awareness campaign to residents of the valley on the workings of the EW system and their response and escape routes.

Potential long term outputs

- GLOF and disaster management plans developed;
- An appropriate EW system in place that can be replicated for other valleys in Bhutan;
- Development of the valley including hydropower development can efficiently use the results of this project (zonation plans, soils and slope studies etc.).

IMPLEMENTATION

Institutional arrangements

The main institution for the implementation of this project will be the Department of Geology and Mines in coordination with Ministry of Agriculture, and Department of Local Governance (Disaster Management Office); also the involvement of the districts of Punakha, Wangduephodrang and the local communities of the area.

Risks and barriers

The main risks are possible lack of local participation from the districts; malfunctioning of the sound system.

Monitoring and evaluation

Monitoring will be done by the Department of Geology and Mines; the project steering committee will evaluate performances on a quarterly basis via meetings on progress and expenditures.

COST

Funds for the project are estimated at USD 0.40 million.

Budget breakdown

Activities	Year 1 (USD)	Year 2 (USD)
Comparative studies to adopt right tool	30 000	
Mapping, data collection and planning for installation of Technical Early Warning System	5000	5000
Procurement & installation of Technical Early Warning System	200 000	100 000
Training on installation and maintenance of Technical Early Warning System	20000	
Workshop/Meeting to create awareness among stakeholders	5000	5000
Professional Services (for setup of the System)	30 000	
Total Cost of the Project		USD 400 000

BURKINA FASO

NAPA PRIORITY PROJECT 1

RÉDUCTION DE LA VULNÉRABILITÉ AUX CHANGEMENTS CLIMATIQUES PAR LE RENFORCEMENT DES DISPOSITIFS DE PRÉVENTION ET DE GESTION DES CRISES ALIMENTAIRES DANS LES ZONES D'OURSIS ET DE BOULSA.

1. JUSTIFICATION

Les plus grandes catastrophes naturelles auxquelles le pays a été confronté, en fréquence comme en sévérité, sont les sécheresses induisant des crises alimentaires aiguës, des pertes en vies humaines et/ou de bétail et générant parfois, le déplacement des populations. Ces sécheresses résultent des phénomènes non maîtrisables tels que l'insuffisance ou la forte variabilité des pluies.

Avec d'une part les changements et la variabilité climatiques et la croissance démographique galopante d'autre part, on peut raisonnablement s'attendre à l'augmentation de la fréquence ainsi que de la sévérité des sécheresses. De même, la mauvaise répartition des pluies pourrait avoir une répercussion sur les productions agricoles et animales ainsi que les produits forestiers et partant, affecter gravement la survie de nombreuses populations.

Il en résulte un très fort risque d'insécurité alimentaire qui, doublé du phénomène de la pauvreté, pourrait, affecter gravement la vie des populations rurales aux revenus réduits. Cette situation est beaucoup plus accentuée dans les parties sahéliennes et sub-sahéliennes du pays qui sont structurellement déficitaires en productions de céréales. C'est pourquoi la mise en oeuvre de ce projet va débiter dans les zones d'Oursi et de Boulsa.

Pour la gestion des crises alimentaires au niveau national, le Gouvernement a adopté une Stratégie Nationale de Sécurité Alimentaire (SNSA) bâtie sur deux grands axes importants: la constitution et la gestion d'un stock de sécurité alimentaire par la Société Nationale de Gestion des Stocks de Sécurité (SONAGESS) et le Plan d'Action du Système d'Information sur la Sécurité Alimentaire (PA-SISA). Ces deux composantes sont présentement mises en oeuvre par les structures techniques nationales avec l'appui des partenaires techniques et financiers.

Au niveau de ces deux composantes on relève quelques difficultés auxquelles il convient de palier pour que la prévention et l'anticipation soient effectives.

En effet, le stock de sécurité alimentaire, les critères de son utilisation ne permettent pas de le mobiliser facilement. De même le stock disponible de 35 000 Tonnes (dont 25 000 Tonnes en stock physique et 10 000 Tonnes en stock financier) ne permet pas de faire face rapidement à une crise alimentaire généralisée à l'échelle nationale. Les banques de céréales constituées dans plusieurs localités par les ONG, les associations de développement et les organisations des producteurs connaissent des problèmes de gestion qui, très souvent, limitent leur efficacité sur le terrain. Aussi est-il nécessaire de pallier à ces insuffisances en renforçant le disponible céréalier à travers la promotion et la mise en place d'un système de gestion efficiente de ces banques de céréales par les populations locales.

En ce qui concerne le dispositif d'information sur la sécurité alimentaire, l'implication des structures locales dans la collecte et la remontée des informations ne sont pas encore effectives. Il est à noter également l'insuffisance dans l'analyse des données, la faiblesse des capacités dans la production de certains outils techniques et la non harmonisation des différents systèmes de suivi. Il y a nécessité d'impulser une plus grande synergie entre les différents acteurs, d'améliorer les communications entre d'une part, les agriculteurs/éleveurs et les agents des services techniques en charge des prévisions climatiques d'autre part. En effet, les agriculteurs/éleveurs ont besoin de prévisions opportunes et fiables qui les informent du début et de la fin de la saison des pluies, de leur déroulement et de la survenue des poches de sécheresse, des crues ou des invasions de ravageurs des cultures.

La sécurité alimentaire d'une zone située l'intérieur d'une région considérée ne peut se concevoir sans tenir compte de l'ensemble de la région et de celles avoisinantes. Il en résulte que la résolution de la sécurité alimentaire des zones d'Oursi et de Boulsa devra se faire en prenant en compte les régions du Sahel, du Nord, du Centre-Nord et de l'Est pour la constitution des banques de céréales et de l'ensemble du pays pour l'organisation du système d'alerte rapide.

2. DESCRIPTION

Objectif global

L'objectif global du projet est de contribuer à éliminer l'insécurité alimentaire liée à la variabilité et aux changements climatiques principalement dans les régions du Sahel, du Nord, du Centre-Nord et de l'Est.

Objectifs spécifiques

- Sensibiliser, informer et former les populations à faire face au risque d'insécurité alimentaire lié aux changements et à la variabilité climatiques dans les 13 régions du pays;
- Renforcer le niveau des réserves en stocks alimentaires disponibles par la promotion, l'organisation et la mise en place de banques de céréales opérationnelles gérées par les populations des quatre régions prioritaires;
- Renforcer les maillons faibles du dispositif national de suivi et d'alerte précoce pour la sécurité alimentaire.

Activités

1. Développer et/ou renforcer les compétences des organisations et des associations des producteurs ainsi que de leurs structures d'encadrement technique et administratif sur les risques climatiques et particulièrement sur ceux liés à l'insécurité alimentaire résultant des changements et de la variabilité climatiques dans les 13 régions du pays;
2. Accroître le niveau des réserves en stocks alimentaires disponibles par la promotion, l'organisation et la mise en place de banques de céréales opérationnelles gérées par les populations des quatre régions prioritaires:
 - la sensibilisation des acteurs impliqués;
 - l'identification de la stratégie de mobilisation des stocks de réserve;
 - l'appui à la mise en place des banques de céréales;
 - la mise en place des banques de céréales par les populations;
 - la prise en compte du stock de sécurité de la SONAGESS.

3. Renforcer les maillons faibles du dispositif national de suivi et d'alerte précoce pour la sécurité alimentaire à travers:
 - Le renforcement, l'amélioration et la structuration des systèmes de collecte des données et informations de terrain, de leur remontée rapide vers les structures locales, nationales et sous-régionales de l'espace sahélien;
 - La mise en place d'un système de suivi rapproché et amélioré du temps et des conditions agrométéorologiques;
 - La diffusion des informations et des conseils en langues nationales sur les prévisions du temps et sur les prévisions saisonnières;
 - L'harmonisation (rapprochement méthodologique et mise en compatibilité) et la mise en réseau des bases des données sectorielles exploitées pour la sécurité alimentaire;
 - Le renforcement des moyens de traitement, d'analyse et de diffusion large des données et informations sur le suivi de la campagne agro-sylvo-pastorale.
4. Identifier et mobiliser les financements endogènes en vue de la pérennisation du système de prévention et d'alerte précoce.

Moyens de mise en oeuvre

Les moyens requis sont les équipements techniques, les ressources humaines et financières et les compétences techniques.

Résultats à court terme

Les résultats à court terme sont:

- Existence dans l'ensemble des régions, de réseaux de producteurs sensibilisés, formés et conscients des risques majeurs liés aux changements et à la variabilité climatiques;
- Existence dans les quatre régions prioritaires, de réseaux de banques de céréales opérationnelles et mobilisables rapidement pour secourir les populations rurales sinistrées;
- Existence de bases de données thématiques, socio-économiques, géo-référencées, fiables, harmonisées, bien structurées et fonctionnelles;
- Existence et disponibilité de cartes de vulnérabilité structurelle et des cartes de vulnérabilité conjoncturelle fiables;
- Des bulletins d'informations et de conseil réguliers et mieux élaborés sur le temps et les conditions agro et hydrométéorologiques de la campagne agro-sylvo-pastorale sont diffusés et permettent aux producteurs de mieux planifier la conduite de leurs activités et aux décideurs de pouvoir anticiper sur les mesures à prendre pour la sécurité alimentaire;
- Des bulletins d'information et d'analyse sur la sécurité alimentaire, facilement exploitables par les différents acteurs, sont disponibles;
- Un capital humain compétent existe tant dans les structures techniques nationales qu'au sein des organisations des producteurs et un système performant de suivi de la sécurité alimentaire fonctionne correctement;
- Des vies humaines et des moyens d'existence sont préservés en cas de conditions météorologiques extrêmes.

Effets potentiels à long terme

- Des mécanismes durables d'adaptation aux CC sont créés et bien maîtrisés par les populations à la base;

- Un système d'information géographique sur la sécurité alimentaire est mis en place et facilite la circulation d'information auprès de tous les acteurs pour une meilleure gestion de la sécurité alimentaire;
- Des bases de données thématiques sont capitalisées dans un Système d'Information Géographique et facilitent la planification du développement ainsi que la gestion de certaines catastrophes naturelles;
- Les contraintes climatiques sont prises en compte par les producteurs dans la planification et la conduite de leurs activités.

3. MISE EN OEUVRE

Arrangements institutionnels

Le projet sera mis en oeuvre par les services techniques et les institutions spécialisées des ministères en charge de l'agriculture, de l'élevage, de l'environnement, de la Météorologie, de l'action sociale, de la promotion de la femme, de l'administration du territoire, et certains partenaires techniques tels que le Centre AGRHYMET du CILSS qui traite des questions de sécurité alimentaire dans la sous-région du Sahel particulièrement en ce qui concerne les questions de formation et d'harmonisation, des méthodologies ainsi que les chambres régionales d'agriculture, les ONG et Associations sont actifs dans ce domaine. La coordination sera effectuée par la Direction de la Météorologie.

Risques et obstacles

Les principaux risques et obstacles sont:

- La non adhésion de l'ensemble des acteurs au système;
- La non disponibilité des financements pour l'ensemble des activités.

4. SUIVI ET ÉVALUATION

Un suivi régulier sera effectué par un comité de pilotage présidé par le SP/CONEDD et qui appréciera le programme ainsi que le bilan des activités. Des évaluations externes à mi- parcours et à la fin du projet seront organisées.

5. RESSOURCES FINANCIÈRES

Activités	Année 1 (en \$)	Année 2 (en \$)	Année 3 (en \$)	Total (en \$)	Coût additionnel (FEM) (en \$)
1. Sensibilisation et formation sur les risques climatiques et particulièrement sur ceux liés à l'insécurité alimentaire résultant des changements et de la variabilité climatiques	25 000	20 000	5 000	50 000	
<i>Sous total</i>	<i>25 000</i>	<i>20 000</i>	<i>5 000</i>	<i>50 000</i>	<i>50 000</i>
2 Mise en place de banques de céréales opérationnelles					
2.1. Sensibilisation des acteurs impliqués	15 000	5 000		20 000	20 000
2.2. Identification de la stratégie de mobilisation des stocks de réserve	20 000	10 000		30 000	30 000
2.3. Appui à la constitution des banques de céréales		100 000	30 000	130 000	130 000
2.4. Banques de céréales des populations*	4 000 000			4 000 000	

2.5. Banques de céréales SONAGES**	2 800 000			2 800 000	
<i>Sous total2</i>	<i>6 835 000</i>	<i>115 000</i>	<i>30 000</i>	<i>6 980 000</i>	<i>180 000</i>
3. Renforcement des maillons faibles du dispositif national de suivi et d'alerte précoce pour la sécurité alimentaire					
3.1 Amélioration de la collecte et du traitement des données	35 000	5 000	5 000	45 000	45 000
3.2. Renforcement du système de prévisions climatiques.	20 000	5 000	5000	30 000	30 000
3.3. Harmonisation du réseau de base de données	6 000	3 000	3 000	12 000	12 000
3.4. Renforcement des moyens de traitement et de diffusion des données	30 000	15 000	8 000	53 000	53 000
Suivi de la campagne agro pastorale par le GTP***	22 000	22 000	22 000	66 000	
3.6. Enquête agricole annuelle et atelier sur bilan céréalier****	60 000	60 000	60 000	180 000	
<i>Sous total3</i>	<i>173 000</i>	<i>110 000</i>	<i>103 000</i>	<i>386 000</i>	<i>140 000</i>
4. Pérennisation du système		4 000	6 000	10 000	
<i>Sous total4</i>		<i>4 000</i>	<i>6 000</i>	<i>10 000</i>	<i>10 000</i>
5. Frais de gestion	10 000	5 000	5 000	20 000	
<i>Sous total5</i>	<i>10 000</i>	<i>5 000</i>	<i>5 000</i>	<i>20 000</i>	<i>20 000</i>
TOTAL	7 043 000	254 000	149 000	7 446 000	400 000

* = La sensibilisation des populations permettra de collecter et stocker 15 000 tonnes de céréales

** = Coût actuel du stock de sécurité actuellement disponible la SONAGES pour ces régions

*** = Montant des financements du suivi de la campagne dans le cadre du PA/SISA

**** = Montant des financements pour cette activité dans le cadre du PA/SISA

BURUNDI

NAPA PRIORITY PROJECT NO. 1

IMPROVEMENT OF SEASONAL EARLY WARNING CLIMATE FORECASTS

Translated from original French version

RATIONALE

Burundi is an agricultural country, with an agriculture system that depends highly on seasonal weather conditions. The farming communities of Burundi, who were accustomed to the regularity of seasons, are now disorientated by climate variability and climate change. The National Weather Service, which was to provide information on climate, was weakened by the socio-economic crisis that the country went through recently. The service is no longer able to provide good forecast information for farming seasons. Good seasonal climate information would make it possible for farmers to better adapt to the adverse effects of climate change. Climate forecasts thus constitute a high priority action.

DESCRIPTION

Global objective

The global objective of the project is to build the human and technical capacities of the National Weather Service in order to establish reliable seasonal climate forecasts.

Specific objectives

- Improved weather forecasts;
- Valorisation of information relating to climate forecasts in key economic sectors.

Activities

Specific objective 1: Improved weather forecasts;

- Enhance the technical equipment receiving data and other regional products;
- Enhance meteorological and hydrological observation networks;
- Enhance national capacities to analyse and interpret meteorological situations that have a strong probability of occurring;
- Conduct advanced training courses for staff in specialised centres.

Specific objective 2: Valorisation of information relating to climate forecasts in key economic sectors

- Create a weather media service to disseminate information to the wider public;
- Assist the services of the Ministry for Agriculture to integrate the climate seasonal forecasts into the technological packages of supervising the rural agricultural world;

Short-term outputs

- A functional system of regional weather data collecting and data processing;
- Meteorological and hydrological observation networks rehabilitated and modernised;
- A functional early warning system;

- A system of national partnership involving the users, the private sector and the providers of information on the seasonal forecasts that are put in place;
- Training of technical staff and experts;
- Set up a national early warning system for the follow-up, and adaptation to climate change.

Long term outputs

- Increased agricultural production;
- Population well adapted to the adverse effects of climate change.

IMPLEMENTATION

Project implementation and institutional arrangements

The project will be carried out under the responsibility of the Burundi Geographical Institute (IGEBU) in the Ministry for Land Management, Tourism and Environment. The project headquarters will be in Gitega where the IGEBU head office is built. IGEBU is the national project implementation agent.

Monitoring and evaluation

The national Project Steering Committee will be composed of representatives of the various ministries that use climate information and representatives of the farmers. Evaluation will be made on a biannual basis by a tripartite commission: Government + UNDP + Donors representatives.

Risks or constraints

- Data relevancy in the field require the involvement of a big number of participants difficult to monitor on a regular basis;
- Lack of support by donors.

Project duration

3 years

COST

USD 500,000

Activities	Cost (USD)
Enhance in priority the technical equipment receiving data and other regional products	150 000
Enhance meteorological and hydrological observation networks	100 000
Enhance national capacities to analyse and interpret meteorological situations with a strong probability of occurring	150 000
Conduct advanced training courses for the executives in specialised centres	50 000
Create a weather media service to disseminate information to the wider public	20 000
Assist the services of the Ministry for Agriculture to integrate the climate seasonal forecasts into the technological packages of supervising the rural agricultural world	30 000
TOTAL	500 000

CAMBODIA

NAPA HIGH PRIORITY PROJECT 3B (NON-HEALTH) STRENGTHENING OF COMMUNITY DISASTER PREPAREDNESS AND RESPONSE CAPACITY

SECTOR

Cross-Sectoral

RATIONALE

The capacity of Cambodian governmental institutions to assist local communities in preparing and responding to climate hazards is restricted to post-disaster rehabilitation and relief. The capacity of local communities to prepare and respond to climate hazards is very limited. Grassroots intervention is required to develop local communities capacity to prepare for and cope with climate hazards.

DESCRIPTION

Objectives

To ensure preparedness for and effective response to climate hazards at the community level;

To reduce climate hazard risks for local communities.

Activities

- Raise awareness and understanding of local communities and authorities (up to the commune level) about the necessity and benefits of preparedness for climate hazards using mass media;
- Develop for individual settlements a flood hazard and response map that includes information on patterns of flood, routes to safety areas, flood levels for evacuation,
- preparation of food stocks and temporary refuge, sanitation and healthcare during floods, and communications before and during flood;
- Train local communities on preparedness and response to storms, including selection of sites for building houses, establishing windbreaks, construction design for windstorms, measures to protect lives and property during windstorms;
- Train local authorities on relief coordination, rescue operations, emergency assistance;
- Supply basic equipment to local authorities and households on a shared cost basis (boats, shelters, communication equipment, life rafts, etc.).

Short-term outputs

- Local communities and authority better prepared for climate hazards;
- Disaster preparedness and response issues incorporated into commune development plans; and
- Community flood hazard and response maps developed and available for use.

Potential long-term outcomes

- Risk of climate hazards to local communities reduced;
- Capacity for coping with climate hazards at the community level improved;

- Poverty reduced.

Location

The project will be implemented in eight provinces: Banteay Meanchey, Kampong Cham, Kampong Speu, Kampot, Kandal, Prey Veng, Svay Rieng, and Takeo.

Time frame

5 years.

IMPLEMENTATION**Institutional arrangement**

NCDM will coordinate the project and implement it in the existing framework for strengthening capacity for disaster management in cooperation with MoH, local authorities and NGOs.

Risks and barriers

Weak coordination among stakeholders, limited participation of local people in the project as it is not an income generating activity, difficulty of access to remote areas.

Evaluation and monitoring

The following indicators will be used: number of communities and local authorities participating in the project, number of basic equipment supplied, and level of ability to prepare for and respond to climate hazards.

Related developments

NCDM has prepared a strategic plan emphasising the need for developing community disaster preparedness but no implementation has been initiated. Oxfam has been working on a comprehensive disaster management programme in Takeo Province including preparedness, mitigation and risk reduction.

COST

<i>USD 5,000,000.</i>

REPUBLIQUE CENTRAFRICAINE

NAPA PRIORITY PROJECT 8

MISE EN PLACE D'UN SYSTÈME D'ALERTE PRÉCOCE ET PRÉVENTION / ATTÉNUATION DES EFFETS NÉFASTES DES BRUSQUES CHANGEMENTS CLIMATIQUES DANS LES COMMUNAUTÉS LOCALES EN RCA

Localisation: République Centrafricaine

Domaine: Catastrophes Naturelles

Type: Prévention / Adaptation aux CC

Référence: Ministère en charge de l'environnement /Comité National de Pilotage de la CCNUCC

JUSTIFICATION

Chaque jour nous entendons parler de décès, de blessures et de destructions dus ou liés à des phénomènes météorologiques, climatiques ou hydrologiques extrêmes. Comment cela est-il possible de nos jours, avec les progrès de la technique, la capacité des ordinateurs et les moyens de communication, notamment les outils mis au point pour observer, comprendre, prévoir et diffuser les informations à l'échelle mondiale. La République centrafricaine, Pays les plus pauvre au monde et enclavé, souffre énormément de ce manque de techniques pour la prévention des catastrophes naturelles, à l'instar des sécheresse accrue ou des récentes inondations qu'à connu le pays. La communauté internationale s'était alors mobiliser pour venir en aide au plus démuné, ce qui avait un coût non négligeable. Mieux vaut prévenir que guérir, aujourd'hui, la RCA sollicite la mise en place d'un système d'alerte précoce à l'instar des autres pays reconnus vulnérables aux risques climatiques.

A titre d'exemple, la RCA est un pays dont l'économie repose principalement sur le secteur agricole. L'agriculture en RCA est assez dépendante des conditions météorologiques saisonnières. Le paysan agriculteur de la RCA qui était habitué à la régularité des saisons se trouve actuellement désorienté par la variabilité et les brusques changements climatiques. Or, le Service Météorologique National qui devait lui fournir des informations climatiques, a été affaibli par la succession des crise socio-politiques que vient de traverser le pays. Il n'est plus en mesure de fournir des informations fiables sur le calendrier agricole et plus précisément sur le comportement de la saison culturale. De bonnes informations climatiques saisonnières diffusées à temps, permettraient aux agriculteurs de mieux s'adapter aux effets néfastes des changements climatiques. Les prévisions climatiques constituent donc une action hautement prioritaire pour mieux s'adapter.

DESCRIPTION

Objectif global

Le projet a comme objectif le renforcement des capacités humaines et techniques du Service météorologique national déjà existant et surtout d'installer de nouvelles en vue d'établir des prévisions climatiques saisonnières fiables.

Objectifs spécifiques

- Amélioration des prévisions climatiques;

- Valorisation des informations en rapport avec les prévisions climatiques dans les secteurs;
- économiques clés du pays.

Objectif spécifique 1: Amélioration des prévisions climatiques à travers les structures déjà existantes

- Renforcer prioritairement l'équipement technique de réception des données et autres produits régionaux;
- Renforcer les réseaux d'observation météorologiques et hydrologiques;
- Renforcer les capacités nationales en matière d'analyse et d'interprétation des situations météorologiques ayant une forte probabilité de se produire;
- Organiser des stages de perfectionnement pour les cadres dans des centres spécialisés.

Objectif spécifique 2: Création d'un Centre (Banque de données) national d'alerte précoce et de prévisions climatiques

- Créer un service météo média pour diffuser l'information au grand public;
- Importer la technologie nécessaire à la mise en place du centre d'alerte et de prévision précoces;
- Assister les services du Ministère de l'Agriculture à intégrer les prévisions saisonnières climatiques dans les paquets technologiques d'encadrement du monde agricole rural.

Résultats à court terme

- Un système de collecte des données météo régionales et de traitement de l'information climatique fonctionnel;
- Des réseaux d'observation météorologiques et hydrologiques réhabilités et modernisés;
- Un système d'alerte précoce fonctionnel;
- Un Système de partenariat national impliquant les utilisateurs, les privés et fournisseurs d'informations sur les prévisions saisonnières mis en place;
- Des Experts techniques et scientifiques sur les prévisions des risques climatiques sont formés;
- Un système national d'alerte précoce pour le suivi et l'adaptation aux changements climatiques mis en place.

Résultats à long terme

- Diminution des risques liés aux brusques changements climatiques et aux variabilités climatiques;
- Amélioration de la production dont les secteurs clés de l'économie les plus soumis aux risques climatiques;
- Adaptation de la population aux effets néfastes des brusques changements climatiques.

Suivi et Evaluation

- Sous la responsabilité du Département en charge de l'Environnement, le Comité national de pilotage de la CCNUCC se charge de l'exécution du projet à travers les 7 régions du pays;
- Des rapports trimestriels faisant état de l'évolution du projet seront soumis aux Bailleurs avec copie au Ministre en charge de l'Environnement.

- Des tournées de sensibilisation sur le terrain, notamment auprès des populations locales seront effectuées régulièrement en vue de les aider à prendre part très activement à la mise en oeuvre du projet;
- Les Départements ministériels sectoriels impliqués seront régulièrement consultés en vue d'avoir les inputs sur l'apport éventuel du projet à l'amélioration de leur production;
- Toutes les parties prenantes à la mise en oeuvre du projet, notamment les ONG seront régulièrement consultées sur l'évolution du projet en vue des rapports trimestriels.

MISE EN OEUVRE

Exécution du Projet et arrangements institutionnels

- Le projet sera exécuté sous la responsabilité du Ministère en charge de l'Environnement en partenariat avec l'Université, notamment les Départements de Géographie et de Physique appliquée;
- L'Agence d'Exécution du FEM qui est le PNUE se chargera de la supervision du projet.

Risques ou contraintes

- Non mise à disposition en temps réel des images satellitaires des différentes régions du pays;
- Fiabilité des données complémentaires de terrain;
- Sécurité / durabilité;
- Manque ou retard de financement.

Durée du projet

3 ans

COÛT TOTAL

USD 500,000

COMOROS

NAPA PRIORITY PROJECT 8

PROJECT SHEET NO. 12

SETTING-UP OF AN EARLY WARNING AND SURVEILLANCE SYSTEM ON SITUATIONS OF CLIMATIC RISKS

SECTOR OF INTERVENTION

Disaster management

RATIONALE

The Comoros experiences different types of emergency situations particularly of hydro meteorological type, which are exacerbated by climate modifications. These situations are characterised by cyclones such as the one that occurred in 1950 and which claimed 524 deaths in Grand Comoro and losses of the same magnitude in the other islands. In 1996, Storm Doloresse claimed 67 deaths in Moheli whereas Cyclone Gafilo was at the origin of the wreckage of SAM-SON, in 2004, which sank with more than a hundred people on board.

Between 1986 and 1999, seven serious cyclones/storms hit the country. Prolonged droughts are also recorded every year with negative impacts on agriculture and health. The setting-up of an information and early warning system is therefore necessary for better preparedness in order to reduce the negative effects of extremes of climate events.

ZONES OF INTERVENTION

The entire national territory

LINKS WITH ONGOING OR PROJECTED PROGRAMMES AND MULTILATERAL AGREEMENTS

National Plan on preparedness and response to emergency;
IOC/METEO EDF Project which aims at minimising risks related to tropical cyclones;
Convention on the fight against desertification.

RECIPIENTS

The entire population.

DESCRIPTION

Objective

Set up a surveillance network of extremes of climate phenomena to ensure preparedness and a relevant response in order to minimise the negative consequences.

Activities

- Studying the risks and drawing-up the cartography of the risky zones;
- Circulating in real time the warning reports on the destructive events;
- Educating the population in order to enable it to make the necessary arrangements to face climate risks;

Inputs

Material and equipment for data acquisition, information processing and circulation system, financial resources, etc.

Short term outputs

The aim of the project is to prevent and prepare the population, through real-time information, on the risky situations in order to reduce human and material losses.

Long term outputs

The project will contribute to capacity-building in terms of management of climate risks, the creation and the regular updating of a database on the extremes of climate events. It will enable to make a judicious choice, and adapt the cultural calendar in relation with weather forecast.

IMPLEMENTATION**Institutional arrangement**

The project will be jointly carried out by the National Directorate of Meteorology and the Directorate for civil security, under the coordination of the Union Ministry in charge of Environment.

Risks and barriers

The level of awareness of the population on climate risks and on support to the provisions to be set up, the limited means of the public services to ensure the regular functioning of the warning system, the limits in the ability to mobilise financial resources could constitute risks and obstacles that may limit the success of the project.

Follow-up and evaluation indicators

- Diminution of human and material losses caused by climate disasters;
- Quantity of obtained data;
- Communication, information and education medium;
- Operationalisation of the coordination and disaster management structures;
- Degree of mobilisation of the communities around disaster management.

COST

<i>USD 75,000</i>

ETHIOPIA

NAPA PRIORITY PROJECT 2 STRENGTHENING/ENHANCING DROUGHT AND FLOOD EARLY WARNING SYSTEMS IN ETHIOPIA

RATIONALE/JUSTIFICATION

in relation to climate change, including sectors concerned

According to the recent IPCC Fourth Assessment Report extreme weather and climate events are likely to increase in frequency and intensity under a changing climate. The report also concluded that the impacts of these events would be severe on developing countries like Ethiopia.

Extreme weather and climate events can be monitored and predicted with current technologies such as numerical weather prediction, climate models, satellites and radars. The National Meteorological services in Ethiopia, however, do not have adequate capacity to provide accurate and timely user specific weather and climate forecast. The current capacity to provide accurate and timely weather and climate forecasts in Ethiopia is limited due to lack of facilities, skilled manpower and technologies. Metrological station networks are not adequate. Communication, satellite and radar facilities that can support generating weather and climate information are lacking

In line with enhancement of meteorological services delivery, there is need to improve physical infrastructure (observation stations, telecommunications, data processing) and climate applications. In order to keep abreast with the rapid and ever changing new technologies especially technologies for advanced meteorological services, there is need to adopt human resource development strategies in information technology.

DESCRIPTION

Objectives

To establish improved drought and flood early warning system in Ethiopia through improved weather and climate monitoring and predication.

Activities

- Assess existing early warning systems and identify gaps in the country
- Improvements of monitoring and prediction facilities:
- Improvement of observational network;
 - Upgrading telecommunication network through modern technologies;
 - Improvement of data processing systems and automation of date quality control, analysis and archival;
 - Development of skilled human resource;
 - Improvement of observational network;
 - Specialized training in Numerical weather prediction(NWP), climate modelling; information technology, meteorological equipment and instrument maintenance;

Short-term outputs

- Improved observational network and telecommunications and data processing facilities;
- Adequately trained human resource at National Meteorological Agency (NMA);
- Improved dissemination techniques;
- Accurate and timely weather and climate forecasts

Potential long-term outcomes

Impacts of extreme weather and climate events on life and property minimized

IMPLEMENTATION**Institutional arrangement**

National Meteorological Agency will lead the coordination of the project.

Risks and barriers

Lack of finance, lack of technical capacity

Evaluation and monitoring

A project steering committee composed of representatives from stockholders will oversee the project. Regular progress reports will be submitted to all concerned bodies by the lead institution and field visits will be conducted, as appropriate.

Evaluation of the project will be carried out by independent technical experts.

COST

Estimated (indicative and tentative) project cost

Full project implementation: USD 10 million

Project design: USD 100,000

GAMBIA

NAPA PRIORITY PROJECT 1

REHABILITATION OF EARLY WARNING SYSTEMS ON CLIMATE RELATED NATURAL HAZARDS

Sector: Water Resources

Project Area: Nationwide

Beneficiaries: Nationwide

RATIONALE

Climate is the main natural hazard threatening lives and livelihoods of the majority of Gambians. Despite the fact that projected changes in temperature and rainfall will almost certainly alter relative magnitudes of hydrological cycle components, the country lacks a reliable climate early warning system and basic infrastructure to reduce the impacts of extreme weather events.

DESCRIPTION

Objectives

To enhance the preparedness of decision-makers and private individuals on impending climate hazards and the opportunity to harness favourable weather conditions.

Specific objectives

- Improvement of national disaster preparedness;
- Integration of climate information in socioeconomic sector planning and decision-making.

Components/Activities

- Strengthening the human resource base and technical capacity of hydro-meteorological networks;
- Improving efficiency of climate information dissemination/delivery to end-users;
- Promoting use of climate information in sectoral plans.

Inputs

- Hydro-meteorological equipment and ICT for the observation networks and control centre;
- Training;
- Public sensitisation.

Short Term outputs

- Functional meteorological and hydrological observation networks capable of providing reliable climate data;
- A functional early warning system;
- Greater awareness for end users of the relevance/importance of weather information.

Potential long term outcomes

- Operational data collection networks are strengthened and made responsive to users' needs;

- Integration of climate information in the national planning process;
- Quality dataset for climate change detection;
- Population well adapted to the adverse effects of climate change.

IMPLEMENTATION

Institutional arrangements

The project will be implemented by the Department of Water Resources in collaboration with other relevant technical departments, namely: Agricultural Services, Planning, Livestock Services and the National Environment Agency and Local Government Authorities. Other stakeholders will be co-opted as necessary. The Department of State for Forestry and Environment will be the executing agency.

Risks and barriers

- Inadequate coordination of the Multidisciplinary Working Group (MWG) to ensure timely input of data and other relevant information;
- Inflation which can affect project costs if implementation is delayed;
- Poor interpretation and use of climate products by end-users;
- Difficulty to prepare adequately for extreme climate events.

Monitoring and Evaluation

The MWG in agriculture, water resources and climate, with its Secretariat at DWR will be responsible for the preparation of reports that will be submitted to the authorities and the NAPA Steering Committee. At the end of the project an independent consultant would evaluate project achievements and advise on improvements needed.

Duration

18 months

COST

Estimated at USD 450,000

ACTIVITY	COST (USD)
Assessment of the state of existing hydro meteorological networks and the proposed flood monitoring stations	5 000
Repair, purchase and installation of hydrology and meteorology equipment /instruments	160 000
Purchase and installation of telecommunication equipment and remote sensing and data processing equipment	30 000
Provision of vehicle for countrywide trekking	25 000
Training of hydrological, meteorological forecasters and agro-meteorologists to technical and professionals levels	150 000
Data processing, publication and dissemination of information on early warning to end users	50 000
Training and Sensitisation workshops/seminars for policy makers and the local communities	15 000
Repairs and maintenance of regional meteorological offices	25 000
Support to collaborating agencies	10 000

Coordination, monitoring and evaluation	5 000
TOTAL	450 000

GUINÉE

NAPA PRIORITY PROJECT 11

OPTION III: PROMOTION DES TECHNOLOGIES APPROPRIÉES EN MATIÈRE D'ADAPTATION PROJET 3-8 ELABORATION D'UN SYSTÈME D'ALERTE PRÉCOCE POUR LA SÉCURISATION DE LA PRODUCTIVITÉ AGRICOLE

Localisation: Tout le pays

Secteur: Agriculture/élevage

JUSTIFICATION

La Guinée est un pays à vocation agropastorale où environ 6,5 millions de la population sont des paysans. Le quart de sa superficie soit 60.000 km² est constitué des terres agricoles. D'après les statistiques, près de 51 % de la population se trouvent au dessous du seuil de pauvreté. La pauvreté de la population est souvent aggravée par les catastrophes naturelles dont les 75 % sont d'origines hydrométéorologiques (fortes averses de pluie, orages violents, tornades et sécheresse). Malgré la position géographique de la Guinée jugée privilégiée à cause de ses nombreux cours d'eau, les activités agrosylvopastorales sont fortement influencées par les fluctuations climatiques et la dégradation des sols. L'accroissement de la production agricole dès lors reste tributaire des conditions météorologiques. Les informations météorologique et agropastorale dans une forme élaborée (par exemple le système d'alerte précoce) permettent aux utilisateurs de décider des actions à entreprendre au bon moment.

DESCRIPTION

Objectifs

Global

Contribuer à la réduction de la pauvreté par la sécurisation de la production alimentaire aux moyens d'un système d'alerte précoce.

Spécifiques

1. Doter la Guinée d'un système d'alerte précoce et d'un modèle de prévision climatique saisonnière;
2. Prendre des dispositions appropriées pour garantir une bonne productivité agricole.

Activités

- Collecte et traitement des données;
- Test et analyse du modèle de prévision saisonnière;
- Elaboration du modèle;
- Suivi-évaluation.

Résultats attendus et applications

- Un modèle de prévision climatique saisonnière est élaboré et testé;
- Un système d'alerte précoce est installé;
- Les ressources humaines sont formées;
- Suivi-évaluation est assuré.

MISE EN OEUVRE**Arrangement institutionnel**

Le projet sera exécuté par les communautés locales, les organisations non gouvernementales (ONG), les groupements d'intérêts et les services techniques spécialisés. La coordination sera assurée par l'unité PANA au sein du Conseil National de l'Environnement (CNE).

Agence de mise en oeuvre

PNUD

Risques

Insuffisance ou arrêt du financement à mi-parcours

Indicateurs de suivi

- Modèle de prévision climatique fonctionnel;
- Système d'alerte précoce fonctionnel;
- Nombre de cadres formés;
- Rapport de suivi-évaluation.

Duree

1 an

COÛT

Coût estimatif du projet: USD 150,000

GUINEA BISSAU

NAPA PRIORITY PROJECT 8 NATURAL-CATASTROPHE PREVENTION PROJECT

Location: Nationwide

JUSTIFICATION

Guinea-Bissau has a surface of 36 125 km². Its overall population is 1 200 000 inhabitants. The country is frequently hit by drought, floods and erosion like in other West African countries. Drought and the danger of accelerated desertification threaten a weak economy and lead to a population exodus towards the countryside.

The government, aware of the situation, has formulated a number of guidelines, of which one relating to the prevention of catastrophes thanks to meteorological information. Unfortunately, meteorology and hydrology services are currently unable to provide an effective contribution into a natural-catastrophe prevention system due to the existing insufficiency in terms of specialised personnel for the application of new technologies and methodology in this field.

On the other hand, lack of equipment and weak management means, coupled with the absence of a national plan for situations of natural catastrophes, need to be taken into consideration under this project. A coherent training and specialisation programme is of capital importance and urgency.

DESCRIPTION

Global objective

The project's global objective is to contribute towards an improvement in populations' living conditions and the protection of the environment and production against effects of natural catastrophes, particularly those related to meteorological and hydrological phenomena through the setting up of an appropriate system of meteorological and hydrological prevention and the dissemination of warnings and advice to users in particular and the population in general.

Specific objectives

- To establish a national centre for meteorological and hydraulic prevention supplied with equipment and qualified personnel capable to ensure the operation of the mentioned centre;
- To educate and sensitise populations on meteorological and hydrological phenomena likely to provoke natural catastrophes;
- To provide meteorological and hydrological information and forecasts through the national committee whilst improving at the same time aeronautical, maritime and fluvial forecasts.

Expected results

- Population sensitised and educated on meteorological and hydrological phenomena likely to cause natural catastrophes;
- A group of meteorologists and hydrologists at the national meteorology centre, personnel from other services, including provincial officers involved in the fight against natural catastrophes, trained;

- Grade IV meteorology and hydrology personnel trained.

Beneficiaries

- National decision makers for the prevention, planning and the fight against natural catastrophes caused by meteorological and hydrological phenomena;
- Transporters (aeronautical, maritime and fluvial) and fishermen;
- Farmers.

IMPLEMENTATION

Institutional Implementation Framework

The Directorate General of National Meteorology National (DGMN), Ministry of Transportation. Taking into consideration contributions of activities relative to natural-catastrophe prevention, all technical services from the Ministries of Natural Resources, Interior, Defence, Rural Development, Information and Communication will be associated to the project's implementation. A national project-monitoring project committee may be set up with the participation of the Ministries of Planning and Public Health.

Monitoring and evaluation

The project will be subject to regular evaluation in accordance with the policy and procedures set out by donors for the project's supervision and execution. The project head will submit a half-yearly report and a yearly synthesis report each year. He will also present a final report at the end of the project. The different reports will be sent to the government, funding agencies and execution agency.

An overall evaluation of project outcomes will take place in the first and third years of its execution, according to procedures set out by financing agencies. Donors will organise evaluation missions in collaboration with the execution agency and the respective outcomes will be communicated to governmental entities.

Risks and Barriers

The project's main risk lies in the State dependence towards projects funded from abroad. Those projects may arrive to and end without assurances of continuity to actions started. Another risk relates to the creation of a budget line needed to ensure the employment of trained cadres and effective outcomes on numbers and quality with a view to retaining those cadres after the project's completion. To deal with the risk, donors' financial contribution will be important throughout project implementation in order to allow a gradual transfer of project to national structures.

Duration

3 years

COST

<i>USD 300,000</i>

GUINEA BISSAU

NAPA PRIORITY PROJECT 10

INTEGRATED FOOD-SECURITY INFORMATION SYSTEM PROJECT (SISA)

Location: Nationwide

JUSTIFICATION

Great disturbances have affected agricultural production lately as a result of the late start of the rainy season and bad rainfall distribution across time. This situation has led to an insufficient supply of agricultural products to populations, rural ones in particular. Services charged with the monitoring of food production through the provision of information on rainfall, cultivated areas, expected income and production levels, animals' and cultures' phytosanitary situation, foodstuff availability in markets, namely agricultural statistics, vegetation protection services, livestock and meteorology services are not operating well due to lack of necessary and adequate means. Hence, it has not been possible to follow up on vulnerability and food security and the consequences translate into considerable delays and even in the non-mobilization of necessary assistance for populations facing food shortage. The situation becomes more serious when the nutritional status of children, pregnant women and elders is affected. This is due to lack of information to allow a rapid reaction based on real data. This is the reason behind the SISA project, which aims at building the capacity of units dealing with the gathering, processing, analysis and dissemination of information about the climate and availability, access and stability of food items, as well as information about the market for those produce.

DESCRIPTION

Global objective

Increase in food security

Specific objectives

To ensure the availability of credible data about the different vulnerability, production and food security parameters.

Components

The early warning system (SAP EWS) and the market monitoring system (SIM MMS) are the components of this project.

Expected results

- Yearbooks on food production and bulletins on food and meteorology situation published.
- Market bulletins published.
- Information available on a timely manner.

Beneficiaries

GAPLA, Vegetation Protection Services, Agricultural Statistics, Livestock Services, Meteorology and Food Security Office and populations.

IMPLEMENTATION**Institutional Implementation Framework**

GAPLA on behalf of the Ministry of Agriculture and Rural Development.

Monitoring and Evaluation

GAPLA/DSSP

Risks and Barriers

Non-allocation of funds in state budget for services involved in SISA

Duration

2 years.

COST

USD 300,000

KIRIBATI

NAPA PRIORITY PROJECT 5
KIRIBATI NAPA SECTION 6.2.6
UPGRADING OF METEOROLOGICAL SERVICES

RATIONALE

Storms, storm surges and onset of droughts will cause costly climate related risks to economic growth and the subsistence livelihood of the people. The regional and national capability for accurately predicting these extreme weather events, and to publicize early warnings can avoid significant loss and costs to both life and property. This capability depends on real time and accurate weather reports from outer stations timely reaching the National Meteorological Service Office and the Fiji Meteorological Service.

Accurate weather reports form the basis of climate data. This data can be used by research communities and for climate change impact assessment.

The current state of the National Meteorological Services has been in disrepair for a long time with inadequate staff and equipment, particularly for outer observing stations. Eight synoptic weather stations have been identified as permanent reference stations but only four are maintained. Of the stations that are maintained the six hourly interval reporting to the National Meteorological Service is not without problems. The other four have been neglected.

There is a clear need for upgrading Kiribati Meteorological Services.

Objectives

1. To improve the reliability and scope of weather observation on outer islands, and reporting to the National Meteorological Services;
2. Institutional strengthening of the National Meteorological Services;
3. To foster greater appreciation and use of various meteorological products that are turned out directly or indirectly from outputs of the National Meteorological Services;
4. To increase the National Meteorological Service role in enabling the public and individuals to be able to manage risks from extreme weather events.

Activities

The equipment used for synoptic observation is outdated, and in poor condition. This situation has partly contributed to gaps in the coverage of weather observation of the Gilbert atolls. Weather observations from four outer island stations are sent to the Meteorological headquarters through HF communication system to the Meteorological headquarters. When this fails, weather observations from these stations are sent to the TSKL. TSKL then relays this over phone to the Meteorological headquarters. Both observing equipment and communication system need upgrading.

The number of outer island stations will be increased by establishing 4 automatic stations equipped with communication systems. These stations are more costly than the currently manned outer station stations, and their costs are included in this project profile for NAPA implementation phase.

Outer island stations and staff need to be regularly visited to boost up their professional morale which is easily dissipated in a dominating sense of timelessness on the outer islands. There will also be specific purposes for these visits such as to install or to check the accuracy of reporting.

The users of meteorological data include researchers and various international programs supporting research on aspects of the climate system. More exposure of the staff to knowledge and information used in these programs will generally raise the standard of professionalism within the Meteorological Service Department.

Outputs

- Outer island stations will have new equipment and be fully manned;
- Regular tour of outer stations by senior officials of the Meteorological Service Headquarters;
- Improved quality management of climate data;
- Meteorological Service is more involved and participating in international programmes on climate and climate change monitoring and predictions;
- Meteorological Service assumes greater responsibility for its products and is more responsive to quality and other users' requirements.

COST

AUD 492,310 (+10% contingency cost)

Indicative costs (AUD)	Local annual budget (AUD)	Total NAPA Costs Over 3 yrs	Responsible Ministry
150 000	342 310	492 310	Kiribati Meteorological Service, MCTTD

LESOTHO

NAPA PRIORITY PROJECT 4

IMPROVEMENT OF AN EARLY WARNING SYSTEM TO REDUCE IMPACTS OF CLIMATE DISASTERS AND HAZARDS

RATIONALE

The need for an early warning system against potential natural disasters can not be over-emphasized. In Lesotho, the natural phenomena that have potential for disastrous effect are tornadoes, droughts, strong winds, hail storms and snow. These events leave masses of people perilously vulnerable to life threatening situations and crop /animal damage wreaking havoc with food security.

Of the principal natural disasters, drought is unique in terms of the length of time between the first indications that a drought may be developing and the point at which it begins to have an impact on populations of the affected areas. Although it cannot be prevented, its impact can be lessened through properly designed and implemented preparedness measures. Today, drought conditions are a common phenomenon which has to be taken into account in all national development plans. Major drought emergencies were experienced in 1932-33, 1945, 1965, 1982-84, 1991-93 and 1994-97.

Experiences of the past have highlighted the need to introduce effective and longterm disaster mitigation, preparedness and response measures. An effective early-warning system must be put in place to effectively respond to climate related natural disasters thereby assisting communities to adapt and minimize adverse impacts of climate change.

DESCRIPTION

Objectives and Activities

Objective	Activity
Development of an early warning system and technical capabilities to monitor and issue warnings on climate and weather extreme events	<ol style="list-style-type: none"> a. Acquisition of equipment to upgrade and increase climate observation network b. Strengthen capacity to monitor weather (drought, floods etc.) and prepare and disseminate long-range forecasts c. Upgrading and strengthening observational and data collection capacity (both meteorological and hydrological) d. Install automatic weather stations at synoptic stations e. Build a climate data bank and develop an archiving system f. Improve warning communication to rural communities

Inputs

- Technical expertise;

- Financial resources.

Short-Term Outputs

- An improved weather monitoring and long-range forecasting;
- An increased meteorological and hydrological observational network;
- An improved relay of early warning to rural communities.

Potential Long-Term Outcomes

- An advanced early warning communication system for rural communities
- A well developed climate data bank
- Early and timely warnings of climate and weather extreme events

IMPLEMENTATION

Institutional Arrangement

The project will be implemented by the Lesotho Meteorological Services in collaboration with the Department of Water Affairs and the Disaster Management Authority.

Risks and Barriers

Potential risks and barriers to the success of the project are:

- Vandalism especially in remote areas
- Insufficient financial resources

Evaluation and Monitoring

Monitoring committees will work in close collaboration with the Lesotho Meteorological Services and the Department of Water Affairs. Monitoring and evaluation will be done on regular basis. The coordinating Departments will prepare quarterly progress and financial reports to the international funding agency during the implementation of the project.

COST

Estimated at USD 920 000

ACTIVITY	COST (USD)
Acquisition of equipment to upgrade and increase climate observation network	230 000
Strengthen capacity to monitor weather (drought, floods etc.) and prepare and disseminate long-range forecasts	120 000
Upgrading and strengthening observational and data collection capacity (both meteorological and hydrological)	200 000
Install automatic weather stations at synoptic stations	150 000
Build a climate data bank and develop an archiving system	75 000
Improve warning communication to rural communities	145 000
Total	920 000

LIBERIA

NAPA PRIORITY PROJECT 2 IMPROVED MONITORING OF CLIMATE CHANGE

BACKGROUND

Prior to the war, Liberia had forty-seven hydrometric networks throughout the country to monitor meteorological and hydrological parameters. The civil war (1990-2003) destroyed nearly all of these facilities. From the period of the end of the civil war to the present, the hydrometeorological monitoring capacities remain non-existent and therefore no recorded data for the period mentioned except the Roberts International Airport and Firestone Rubber Plantations Company.

JUSTIFICATION

The annual variability of rainfall experienced in Liberia manifests changes in our weather and thus in our climate. Water resources, agriculture, forestry, aviation, fishery, land transport, etc. are vulnerable to changes and variations in our climate. Henceforth, predicting climate change, including regional aspect of analysis of climate variability constitute the primary in the planning and operational stages in these sectors.

DESCRIPTION

Overall Objectives

The principal objective is to aid national adaptation capabilities through the generation of hydrometeorological data and improved networking for the measurement of climatic parameters.

Goals

The major goals of the project are as follows:

- To make hydro meteorological information timely available to end users;
- To improve informed decision making;
- To enhance effective networking among stakeholders.

Expected Results

The major results expected from the implementation of the project are as follows:

- Availability of hydro meteorological data;
- Strengthened national capability to forecast climatic events thereby reducing level of vulnerability to climate hazards;
- Strengthened coordination among climate related institutions.

Activities

The major activities of the project are as follows:

- Rehabilitate existing hydro meteorological stations;
- Establish hydrometric networks at river basins;
- Acquisition of materials and equipment;
- Conducting training programme for hydrometeorological personnel;
- Provide public awareness.

Indicators

The major indicators that will be reviewed to assess the efficacy of the project are as follows:

- Existing hydro meteorological stations functional;
- Report of Hydro meteorological data;
- Adequate personnel trained;
- General public informed.

Risks

There are two major risks associated with the implementation of the project, namely the security situation of the country and the fulfillment of co-funding commitments.

Institutional Arrangement

The key national institutions that would be involved in the project are the Ministries of Transport, Lands, Mines and Energy and Environment Protection Agency

Duration

The duration of the project is set for twenty-four (24) months

COST

A total budget of USD 3 million is needed.

MADAGASCAR

NAPA PRIORITY PROJECT 005

MISE EN PLACE DE STRUCTURE LÉGÈRE ET/OU RENFORCEMENT DU SERVICE MÉTÉO DÉCENTRALISÉ

DESCRIPTION

La prévision météorologique est l'un des meilleurs moyens pour amortir les dégâts causés par les perturbations climatiques sur les groupes vulnérables. En effet l'information sur les prévisions météorologiques permettra aux producteurs d'adapter leurs techniques culturales. Une fois que les informations sur les changements ou variation climatiques soient passées, la population en générale peut prendre toutes les dispositions qui s'imposent pour que certains facteurs cruciaux déterminant leur mode de vie ne soient pas perturbés: approvisionnement en médicaments de base ou génériques pour préserver son état de santé, augmentation des réserves en eau potable, etc ...;

Objectif

L'objectif de ce projet est de mettre en place pour chaque région un service météorologique pour prévoir et communiquer à la population les prévisions météorologiques

Activités

1. Réhabilitation des stations déjà sur place
2. Mise en place des stations sur les régions qui n'en disposent pas.
3. Formation des personnels du service météorologique

Intrants

Les intrants principaux sont les matériels et les personnels pour le renforcement des stations météorologiques...

Résultats attendus à court terme

- Stations météorologiques opérationnelles;
- Information diffusée à temps sur la prévision météorologique;
- Techniques améliorées adoptés par les paysans.

Résultats potentiels à long terme

- Augmentation des rendements de production;
- Maîtrise de l'impact de changement climatique sur l'économie national;
- Réduction de la pauvreté.

MISE EN OEUVRE

Arrangements institutionnels

Direction de la météorologie, MAEP, Autorités régionales et locales, les maîtres d'oeuvre délégué

Risques et obstacles

- Disponibilité des moyens de la mise en oeuvre;
- Adoption des techniques nouvelles par les paysans.

EVALUATION, SUIVI ET RESSOURCES FINANCIÈRES

Total: USD 113,620

Indicateur objectivement vérifiable (IOV)	Montant (USD)		
	ANNEE 1	ANNEE 2	ANNEE 2
Service Météo opérationnel par région	45 500	68 120	0
TOTAL			113 620

MALAWI

NAPA PRIORITY PROJECT 4

MALAWI NAPA PROJECT (d)

IMPROVING MALAWI'S PREPAREDNESS TO COPE WITH DROUGHTS AND FLOODS

RATIONALE

Malawi receives an average of 850 mm of rainfall per year. This amount is adequate for rain-fed crop production, and for recharging underground aquifers. However, the distribution and consistency of the rainfall is very erratic and uneven, so that the whole of Malawi is prone to hydrological droughts. The worst affected areas are central-southern Karonga, the Bwanje Valley and the Shire Valley.

Droughts result in reduced river flow rates, and the complete drying up of rivers. The water table also recedes, thereby affecting boreholes and wells which are major sources of potable water in rural areas. Thus, alternative ways of ensuring adequate water supply for rural communities need to be explored and implemented.

The interventions are likely to be site-specific, depending on terrain, soil type, and methods of water extraction and delivery, among many others. Some of the potential interventions include the construction of medium to large scale dams, and small rainfall harvesting structures, such as water troughs, small dams and infiltration gullies. In addition, deep wells can also be constructed for the provision of water for domestic purposes, irrigation, as well as for animal use.

Floods in Malawi have been associated with heavy upstream rainfall resulting in too much water down stream that leads to the breaking-up of river banks. For example, this is a common feature on the North Rukuru in Karonga, Likangala in Zomba, and the Ruo/Shire Rivers in Chikwawa/Nsanje. An interesting phenomenon around the Ruo/Shire confluence is that the intense flow from the Ruo River tends to block the Shire River, which results in the Shire River swelling up stream. Malawi has also experienced flush floods due to prolonged torrential rains, such as the Phalombe flush floods in 1991 that killed over 1,000 people, and wiped out villages, crops, livestock and property.

Potential interventions include flood protection structures such as levees, dykes, canals, dams, and in the case of Ruo River, diverting the river to meet the Shire at an angle downstream.

DESCRIPTION

Objective

The main objective of the project is to enhance the country's preparedness in swiftly responding to emergencies caused by floods and/or droughts so as to reduce the negative impacts on vulnerable communities.

Activities

The activities will include the following:

- Conducting rapid assessment of drought and flood risks, resulting in flood delineation and zoning maps;
- Establishing flood forecasting and warning systems;

Developing and implementing flood mitigation measures;
 Establishing drought forecasting and warning systems;
 Developing and implementing drought mitigation measures;
 Capacity building for rapid response to extreme climate change events.

Inputs

The inputs include small equipment, human, physical and financial resources, including vehicles, computers and accessories.

Short-term outputs

These will include the following:

- Flood delineation and zoning maps produced;
- Flood control works established;
- Staff trained to operate and maintain advanced FEW system in place;
- Drought mitigation works established and commissioned;
- Forecasting and early warning systems put in place.

Potential long-term outputs

These will include the following:

- Appropriate legal framework on climate change and potential disasters developed;
- Flood and drought preparedness plans developed;
- Multipurpose dams along the Shire River to control flood, conserve water and HEP generation, constructed.

IMPLEMENTATION

Institutional arrangements

The lead institution in the implementation of this project will be the Department of Meteorology in collaboration with the Ministry of Water Development, Ministry of Agriculture, NGOs, CBOs, local communities and The Malawi Polytechnic (Civil Engineering Department).

Risks and barriers

The main risks include the security of structures against vandalism, and the possibility of lack of interest to participate by the targeted rural communities.

Monitoring and evaluation

Monitoring will be done by the Department of Meteorology, whereas EAD will coordinate the evaluation exercise on quarterly basis based on various types of reports. Monitoring will be done monthly through inspection, meetings and expenditure returns.

Log frame for Improving Malawi's preparedness to cope with droughts and floods

	Narrative of the Intervention Logic	OVI of Achievement; and Sources and Means of Verification
Overall objective	The main objective is to enhance the country's preparedness to respond to the emergencies of floods and/or droughts so as to reduce the negative impacts on vulnerable rural communities.	Capacity to quickly and urgently respond to disasters from floods and/or droughts
Project purpose	To identify and map vulnerable areas; To develop forecasting and early warning systems; To build and install adaptation measures for floods and droughts.	Numbers of FEWS monitoring stations installed; Number flood mitigation structures constructed; Number of members of staff trained and the types of skills; Number of drought mitigation structures constructed; Volume of water stored; Number of dykes or canals (and their lengths) constructed; Number of rural households trained in the management of water supply structures/systems; Number of people benefiting/ served.
Expected outputs	Flood zoning maps delineated; Flood control works developed; Staff to operate and maintain advanced FEWS systems trained; Drought adaptation and mitigation works developed; Forecasting and early warning systems put in place.	Reports giving details on the number of structures constructed, and the number of people involved and/or affected; Report on the number of household members; Number of FEWS monitoring stations that are in operations.
Activities	Conducting rapid assessment of drought and flood risks, and delineating zoning maps; Establishing flood forecasting and warning systems; Developing and implementing flood mitigation measures; Establishing drought forecasting and warning systems; Developing and implementing drought mitigation measures.	Detailed budgeted (USD 8.00 million), and project reports (monthly, quarterly and annual).

COST

Funds for the project are estimated at USD 8.00 million.

Budget breakdown

	Year 1	Year 2	Year 3
Rapid assessment and zoning	450 000		
Forecasting and Early Warning system	1 000 000	1 000 000	1 000 000
Capacity building Train staff to man the systems	70 000	70 000	70 000
Flood Mitigation works	800 000	800 000	800 000
Drought mitigation works	400 000	400 000	400 000
Project management & M&E Operations Equipment Consultative workshop	250 000	245 000	245 000
Total Cost of the Project	2 970 000	2 515 000	2 515 000

MALAWI

NAPA PRIORITY PROJECT 5

MALAWI NAPA PROJECT (e)

IMPROVING CLIMATE MONITORING TO ENHANCE MALAWI'S EARLY WARNING CAPABILITY AND DECISION MAKING AND SUSTAINABLE UTILIZATION OF LAKE MALAWI AND LAKESHORE AREAS RESOURCES

RATIONALE

Lake Malawi is one of the world's most important fresh water bodies because of its unique and endemic flora and fauna. Lake Malawi has an estimated 700 to 1000 fish species. It is the largest source of fresh water fish, which constitute about 60-70% of animal protein intake in Malawi, and provides employment to over 300,000 people as fishermen, processors and in primary and secondary marketing and distribution activities. The fisheries sector contributes 4% of the GDP. The lake is the source of Shire River, which produces about 95% of hydroelectric power, and a major source of potable water for the cities of Blantyre and neighbouring towns, such as Chiradzulu. Lake transport is also becoming an increasingly important and cost effective way of linking lakeshore town centres and townships across the border with Mozambique and Tanzania.

The fisheries sector has been experiencing a number of vulnerabilities such as floods and droughts that have led to loss of habitats. These factors have contributed to the decline in fish catches from 60,000 tonnes in the 1980s, to about 40,000 tonnes per year currently. The disappearance of some species, such as Mbuna, whose habitats are threatened by declining water levels and other environmental factors, is a real threat to the fishing industry in Malawi. If the current trends are not reversed, the loss of biodiversity will be inevitable and irreversible. In addition, the short-term fluctuations in wind pattern that have become more variable in recent times due to climate change pose a challenge to fishers; the noted increased temperature may have likely contributed to the decline in fish production as has occurred in Lake Tanganyika. A monitoring and observation system could provide for an early warning system in conjunction with other national and regional systems. This will promote pre-disaster preparedness and formulation of mitigation strategies while adaptation measures are urgently needed to respond to the declined fish catches.

The water levels in Lake Malawi and the Shire River affect water flow rates downstream. For example, the droughts of 1991/92-crop season reduced the hydroelectric power (HEP) generation from 240 megawatts (MW) down to 80 MW. The worst-case scenario occurred between 1915 and 1937 when there was no water outflow from the lake due to lowered lake level, so that during this period the Shire River stopped flowing. There is, therefore, need to monitor the weather, and lake levels on Lake Malawi, so as to develop systems for weather forecasting and for advising stakeholders on possible steps to be taken in the event that droughts and floods strike.

DESCRIPTION

Objectives

The main objective of the project is to establish a climate monitoring and early warning system on Lake Malawi and lakeshore areas for timely provision of accurate information for pre-disaster preparedness to rural fishing and farming communities and to promote short and long-term adaptation livelihood skills to riparian communities in the face of dwindling fish catches.

Activities

The activities to be conducted will include the following:

- Identifying potential sites to install early warning systems in collaboration with the local fishing communities and other stakeholders;
- Procuring, installing and commissioning of equipment;
- Training local staff in the operation and maintenance of the system;
- Collecting, processing, storing, updating, packaging and/or disseminating data and information to various stakeholders;
- Establishing a website for information dissemination and sharing;
- Undertaking research to assess the productivity of fish under erratic rainfall and changing climatic conditions;
- Undertaking mitigation measures based on the above findings;
- Establishing a fish gene bank to maintain genetic diversity of the freshwater fish resources;
- Establishing fish breeding and fish farming sites for restocking, food security and income generation.

Inputs

The project will require human, financial and physical resources, which will be detailed out in the final project proposal.

Short-term outputs

These will include:

- Improved climate monitoring on Lake Malawi and lakeshore areas to improve decision making and provide early warning systems for the fisheries, transport, tourism, water and HEP energy sectors;
- Climate database on Lake Malawi and its shores developed and disseminated;
- Fish breeding and fish farming to safeguard fisheries and to conserve biodiversity developed;
- Fish breeding facilities on Lake Malawi to help restock the fish in the lake and rivers established;
- Fish farming enterprises established.

IMPLEMENTATION

Institutional arrangements

The Project will be executed by the Meteorological Services and Fisheries Departments as lead institutions, in collaboration with the local fishing and farming communities living along the lakeshore districts. Other stakeholders will include ESCOM, Department of Marine Engineering, Department of Tourism, NGOs, CBOs, Mzuzu University and Bunda College. Ministry of Agriculture and Food Security, Department of Parks and Wildlife.

Risks and barriers

Some of the pertinent barriers include:

- Low participation by local fishing and farming communities,
- Resources to undertake the planned activities may not be inadequate, and
- Lack of cooperation from other stakeholders.

Monitoring and evaluation

Monitoring will be done by the Meteorological and Fisheries Departments. The EAD will coordinate the evaluation exercises to assess the impact of the project.

Log frame for improving climate monitoring to enhance Malawi's early warning capability and decision making and the sustainable utilization of Lake Malawi and lakeshore areas resources

	Narrative of the Intervention Logic	OVI's of Achievement; and Sources and Means of Verification
Overall objective	To establish a climate monitoring and early warning system in order to provide timely and accurate information for the sustainable utilization of the Lake Malawi and lakeshore resources.	Availability of decision support systems in support of communities living along lakeshore areas
Project purpose	<p>To install a climate monitoring and early warning system for Lake Malawi and lakeshore areas;</p> <p>To process, package and disseminate timely data to all stakeholders;</p> <p>To promote conservation and fish biodiversity;</p> <p>To promote fish farming along the Lake Shore areas.</p>	<p>Number of monitoring stations;</p> <p>Number of stakeholder connected;</p> <p>Number or variety of species in the fish gene bank;</p> <p>Number of fish farming sites along the lakeshore.</p>
Expected outputs	<p>Improved climate monitoring for Lake Malawi and lakeshore areas to improve decision making for the fisheries, transport, tourism, water and HEP energy sectors;</p> <p>Climate database for Lake Malawi and its shores developed;</p> <p>Fish breeding and fish farming programmes to safeguard fisheries and to conserve biodiversity established;</p> <p>Fish breeding facilities on the Lake Malawi to help restock fish into the lake and rivers established;</p> <p>Fish farming enterprises established.</p>	<p>Number of climate-monitoring stations established;</p> <p>Number of sectors or stakeholders benefiting;</p> <p>Database and network connectivity established;</p> <p>Number of enterprises established;</p> <p>Number, age and gender of entrepreneurs involved;</p> <p>Number of breeding sites established;</p> <p>Number of fish farming enterprises established;</p> <p>Number of rivers restocked with fish.</p>
Activities	<p>Identifying potential sites to install early warning systems in collaboration with local communities and other stakeholders;</p> <p>Procuring, installing and commissioning equipment;</p> <p>Training local staff on how to operate and maintain the system;</p> <p>Training of local staff on predictive capability and modelling;</p> <p>Collecting, processing, storing, updating, packaging and/or disseminating data to various stakeholders;</p> <p>Establishing a website for information sharing and dissemination;</p> <p>Undertaking research to assess the productivity of fish under changing climatic conditions;</p>	Detailed budgeted (USD 5.43 million) versus expenditure report, and project reports (monthly, quarterly and annual).

	Undertaking mitigation works based on the findings above; Establishing a fish gene bank to maintain the genetic diversity of fish.	
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COST

The project is estimated to a cost of USD 5.43 million

Budget breakdown

	Year 1	Year 2	Year 3
Site identification	180 000	50 000	50 000
Procure equipment	1 500 000	100 000	100 000
Train staff	75 000	75 000	75 000
Install and commission equipment	100 000	100 000	100 000
Fisheries research	500 000	350 000	300 000
Fisheries gene bank	275 000	250 000	250 000
Project management	350 000	300 000	300 000
Total Cost of the Project	2 980 000	1 225 000	1 225 000

MOZAMBIQUE

NAPA PRIORITY PROJECT 1

FIRST ACTION: STRENGTHENING OF EARLY WARNING SYSTEM

INTRODUCTION

A proactive attitude in relation to natural disasters depends necessarily on deep knowledge on the type and quality of environmental conditions in which one lives. The success of early warning system plans with the view to reduce the effects resulting from environment phenomena, as important part of management of such natural disasters, depend on knowledge that the intervenient have on the same phenomena, of their impacts, of the contention and adaptation measures and also of an effective communication. Thus, public education on the prevention and adaptation methods is crucial in the management of disasters under the framework of adaptation to climate change.

RATIONALE OF THE PROPOSED ACTION

The need for communities to have timely early warning information and the awareness of actions to be taken based on information received may reduce the loss both of human lives and the properties that normally takes place when extreme events occurs.

Considering the extensive network of pluviometric stations that the Ministry of Agriculture has mirrored in all corners of the country, there's a need to standardize these stations with those used by the weather services and equip them so that they can collect information on meteorological elements, in a format that can contribute to improve the precision of weather and climate variability.

The collected data will help to make weather forecast more precise and seasonal and will also help for future climate studies in the different sectors. In addition, it will help to improve the transmission of information on time.

DESCRIPTION

Objectives

To strengthen the early warning system so that the information can reach the affected communities in good time in a way and format those communities can use it.

This information specifically aims to:

- Evaluate the current state and functionality of the early warning system;
- Identify the local knowledge of forecasting climatic events and evaluate its adaptability in the early warning system;
- Evaluate the degree of the vulnerability risk;
- Monitor the functionality of the early warning system so as to identify in opportune moment to the deficiencies of the system.

Expected Results

Due to the level of difficulties that each activity presents, the expected results can be sub-divided into long term comprising 2 (two) to 5 (five) years and short term understood to be a period inferior or equal to 2 (two) years.

Long term results I

Weather forecast system and improved seasonal forecast and consequent reduction of losses of human lives and properties.

Short term Results I

More precision in the weather and seasonal forecast resulting from standardization of existing pluviometric stations in the country under the auspices of various organizations (ex: Ministry of Agriculture, world vision, Plexus, etc.) with the stations of the national meteorological network under the auspices of the National Institute of Meteorology and increase the density of the national meteorology stations.

Activities to carry out

- Information survey on the current existing pluviometric stations at national level and its evaluation in order to integrate these into the INAM meteorological stations to standardize the collection of meteorological data;
- Survey of the present state of stations of the national meteorological and hydrological network of stations and evaluate the need to install new stations in other local areas
- Install new meteorological and hydrological stations in identified local priority locations.
- Standardize the collection of data from the pluviometric stations under the auspices of the Ministry of Agriculture, Fisheries, ARA's, INAM, world vision, Plexus, and other organizations operating in the area;
- Train technicians in charge of collecting data from the standardized stations;
- Enable the meteorological services to update seasonal forecast every month.
- Improve the quality of network and operation of hydro-metric and hydro-meteorological stations, through the use of modern equipment.
- Reinforce the storage and processing of data and the dissemination of hydrological information.
- Create a permanent technical committee to monitor the evolution of exchange mechanisms of information between different segments of management of water resources.
- Strengthen institutional capacity in the collection, analysis, validation and monitoring of hydrological data, through the holding of training courses.
- Consolidate (or dynamize) the continuous maintenance of used equipment in the hydrometric stations to guarantee and quality of collected data.

Long term results II

Early warning information timely received from the affected administrative posts or at risk.

Short term results II

Risky and vulnerable areas identified, classified under the risky and vulnerable point of view and mapped up to the level of Administrative Post.

Activities to develop

- Select, on the basis of the existing information on vulnerability, the districts to be considered in the pilot phase;

- Work out the social, economic and physical profile of the Administrative Posts which are vulnerable to drought, floods and tropical cyclones;
- Map out and classify Administrative Posts according to the degree of vulnerability;
- Requalify crowded populations from flood and cyclone prone areas;
- Identify the places of refuge and evacuation channels in the Administrative Posts which are prone to hydro-meteorological events.

Short Term Results III

System to disseminate locally-established early warning mechanisms.

Activities to develop

- Identify and evaluate the local systems for the management of extreme events (examples: the appearance in a certain place of some birds in a determined season of the year, the change of colours in leaves of some trees);
- Identify, together with the communities and administrative bodies, necessary actions to improve the local systems for the management of extreme events, including the installation of a system to receive and disseminate early warning information in due time;
- Support the improvement of communications means and access roads in the country and particularly in risky and vulnerable areas;
- Strengthen the capacity and the involvement of media organizations in the dissemination of warning information and of encouragement to communities on matters of climate change;
- Use of local (informal) communications channels, for example, religious authority, community, school authority, etc.
- Improve the information exchange mechanisms with neighbouring countries under the framework of weather and seasonal forecast;
- Promote the creation and training of local committees to manage climate disasters.
- Promote the exchange of experiences among local communities on local skills to manage extreme events, including actions carried out to minimize their effects;
- Divulge and encourage local communities on matters linked to climate change, causes and effects.
- Monitor the forecast evolution taking into account possible changes they may occur during the rainy season;
- Create a monitoring committee for the purpose.

Long Term Results III

Improve inter-sector coordination in the use and dissemination of warnings and in the assistance to communities.

Short Term Results IV

Reduce the duplication of efforts and resources in activities to support communities vulnerable to extreme climate events.

Activities to develop

- Train technicians of relevant sectors (such as fisheries, water, agriculture, health, environment and management of natural disasters) in the use of early warning and seasonal forecast and dissemination ways in communities;

- Strengthen the capacity and involvement of the Mozambique Armed Forces in rescue operations;
- Identify, map out and evaluate the activities and/or mandates of different groups and/or integrated communities in the management of risk, natural disasters and climate change;
- Establish synergies between the different committees/groups that deal with issues related to climate change and/or natural disasters;
- Create the data base on studies made and or implemented projects in the country on climate change and/or management of risk of natural disasters as well as of experts on these fields;
- Train local bodies in data systematization on natural disasters;
- Produce matters and radio and television programmes and other education means (theatre, debates/workshop) and of encouragement on issues linked to climate change;
- Hold regional seminars for publication and encouragement.

Risks and Barriers

Peace and political stability are essentials for success in the implementation of any project. The identified risks and barriers that can block success are:

- Communications problems allied to bad conditions of access roads are factors that can constitute barriers in the holding of proposed activities in this action;
- Weak precision of weather and seasonal forecast, derived from various factors of which the following can be stressed: weak sensibility of people in charge of collecting data, weak density of meteorological stations, weak technical capacity and the obsolescence of used equipment in the collection of data.
- The weak level of education.
- Strong departmentalization of sectors.

IMPLEMENTATION

The implementation of activities listed in this action will be of the responsibility of specialized entities, INAM, INGC, Technical Committee for the Management of Natural Disasters, (CTGC) MINAG, MTC, MEC, ONG's, MOPH (DNA, ARA's ANE), MPescas, MAE, INTC, Media, Rsearch Institutions, Private Sector and the Civil Society in general.

BUDGET

Estimated at USD 2,700,000

Activities	Estimated cost in USD
Mapping and requalification of administrative posts and crowded people	1 280 000
Rehabilitation or installation of Synoptical/Pluviometric and hydrological stations	300 000
Training and capacity building	150 000
Education and sensitization	100 000

Seminars (10 Prov., 1 National)	105 000
Improvement of Communications system	100 000
Creation of systematized data bank at district level on the occurrence and impact of natural disasters	165 000
Creation of disaster management local committees	500 000
Total	2 700 000

In an initial phase, the installation and/or rehabilitation of about 15 synoptical stations are envisaged following a territorial distribution almost in a uniformed mesh. Mapping will be carried out in all administrative posts covered during the participative validation process (see map of picture 3 in NAPA).

NIGER

NAPA PRIORITY PROJECT 8
NIGER NAPA IDENTIFICATION SHEET 8
PRODUCTION AND DISSEMINATION OF AGRO-METEOROLOGICAL DATA.

GEOGRAPHIC LOCATION

Chétimari rural district (Department of Diffa/ Diffa Region);
 Loga rural district (Department of Loga/ Dosso Region);
 Sakabal rural district (Department of Dakoro/ Maradi Region);
 Kaou rural district (Department of Tchintabaraden/ Tahoua Region);
 Tondikiwindi rural district (Department of Ouallam/ Tillabéri Region);
 Village of Tamallolo (Department of Tanout/ Zinder Region).

SECTOR

Agriculture and cattle breeding

RATIONALE

Multi-year droughts, locust invasion, floods and land deterioration are mainly responsible for the decrease in agro pastoral production, thus exposing the vulnerable populations to food insecurity. Information dissemination (agro-meteorological counseling) as well as efficient preventive and alleviating measures can contribute to lessen the adverse effects of climate changes on the production. On the other hand, this information is not well known to the producers and they are often inadequately utilized. Thus, information dissemination in rural areas becomes necessary. the project is in line with the Poverty Reduction Strategy, unique national framework of reference as regards to economic and social development of the country, as it comes out from the PRS that the Niger populations being mainly rural, amply justifies that the rural sector must constitute the principal engine of economic growth at short and medium term. the agricultural sector represents alone nearly 40% of gross domestic product (GDP) of Niger. Thus, Agriculture must be used as lever of the economic growth in rural area. The production and diffusion of agroclimatic information to the rural populations will highly contribute to their adaptation to rain irregularities.

DESCRIPTION

Overall objective

Contribute to the achievement of food security for the population in the project areas.

Specific objectives

- Increase crop production;
- Increase livestock productivity;
- Increase the incomes of the most vulnerable populations in the project area;
- Build the populations' capacities towards a better understanding of climatic events and early alert system.

Technical and financial feasibility

Technical feasibility

- Existing structures for observations, concentration, analysis and dissemination of data;
- Existing tools for data processing;
- Existing of training organizations (technical services);
- Needs expressed by the populations during field visits;
- The project objectives match the PRS orientations.

Financial feasibility

- Support from GEF;
- Contribution from the government;
- Contribution from local authorities;
- Contribution from beneficiary communities;
- Presence of other projects in the project area (PAC, CILSS-SVS project)

Expected results:

- The use of agro-meteorological counselling by the farmers whose operational planning is promoted;
- Early alert to climate risk is operational.

Activities

- Creation of community radios in Kaou, Sakabal, Tondikiwindi and Tamallolo;
- Identification, with producers, of relevant data to be disseminated;
- Consultation with stakeholders (local technical services) in charge of data collection and those in charge of information dissemination (community radios, farmers organizations, NGOs);
- Training of producers;
- Training of stakeholders in data collection and dissemination;
- Building of meteorological observation network and supply of technical services with equipment for data collection and processing;
- Collection and transmission of base data;
- Production of agro meteorological bulletins;
- Monitoring and evaluation.

Project-related risks

- Delay in cash flow;
- Delay in data flow.

Institutional set-up

The project is under the responsibility of the Ministry in charge of meteorology in collaboration with the decentralized departments of food crop, animal resources, local NGOs and community radios. The coordination and monitoring of project activities will be carried out by the national Environmental Council for a Sustainable Development (CNEDD).

Monitoring and evaluation

Monitoring and evaluation indicators

- Number of radio stations created;
- Number of trained people;
- Number of agro-climatic bulletins broadcast;
- Number of producers using these data.

Monitoring and evaluation mechanisms

- Annual surveys;
- Field visits;
- Report issued.

Project duration

Three years.

SAMOA

NAPA PRIORITY PROJECT 4

PROJECT PROFILE 4: CLIMATE EARLY WARNING SYSTEM PROJECT TO IMPLEMENT EFFECTIVE EARLY WARNING SYSTEMS AND EMERGENCY RESPONSE MEASURES TO CLIMATE AND EXTREME EVENTS

Projections on future climatic patterns for tropical regions are unclear due to their high correlation with natural hazards. A future warm climate will likely have implications for future populations if the intensity and frequency of such natural disasters (including tropical cyclones, droughts, and flashfloods) increases as well.

Tropical cyclones Ofa (1990) and Val (1991) were 50- and 100-year events and caused a total of \$440 million of damages four times the GDP and 23 fatalities. Prior to this, El Nino related droughts in 1983-84 and 1997-98 resulted in water shortages and widespread fires in dry native forest areas. Early warning systems can help relevant sectors and the community as a whole to take steps to minimize damage caused by extreme climatic events.

RATIONALE

Without the appropriate systems in place, the impacts of climate change on vulnerable sectors and communities are to a large extent unforeseen, and the frequency and intensity of climate related hazards unpredictable. Therefore, an effective early-warning system must be put in place immediately, to respond to the threat of each hazard and to ensure vulnerable sectors and communities have the information they require.

The implementation of effective early warning systems would significantly assist Samoa to carry out appropriate and sustainable sectoral and community activities to adapt to and hence minimize adverse impacts of climate change.

DESCRIPTION

Key Objectives

- To upgrade technical early warning systems and associated technical capabilities to monitor and warn against climate and extreme events;
- To build sectoral and public capabilities to understand and use climate and early warning hazard information.

Expected Outcomes

- Improved local position forecasting and capability;
- Improved warning relay to remote communities, more accurate real time feedback and relevant local forecasts;
- Improved 3 month lead outlooks on drought probabilities, improved input into resource management systems (water, forestry, agriculture, energy);
- Improved timely warnings, monitoring and identification of flood prone areas

Suggested Actions Required	Indicators / Expected Outputs	Potential Long-Term Outcomes
Increase resilience of village communities	Improved local position forecasting and capabilities;	Advanced early warning relay for remote village communities;

from tropical cyclones	Improved early warning relay to remote communities; More accurate real time feedback and relevant local forecasts.	Improved accuracy of feedback and local forecasting
Increase Resilience of village communities from drought	Improved 3 month lead outlooks on drought probabilities; Improved input into resource management systems (water, forestry, agriculture, energy)	Advanced early warning on drought probabilities by three months; Ample preparation for water shortages by communities; Ample preparation for operational users such as the resource management systems
Increase resilience of village communities from flooding associated with heavy rainfall, TCs and storm surges	Improved timely warnings; Monitoring and identification of flood prone areas.	Early and timely warnings on flooding; Ability to identify flood prone areas with emphasis on highly vulnerable communities; Continuous monitoring and evaluation.

IMPLEMENTATION

Institutional Arrangements

Implementing Agency: MNREM

Coordinating Agency: MNREM, Steering Committee

Associated Agencies: MNREM, MWTI, SPA, SSC, SWA, EPC, SamoaTel, PUMA, MOH, NDMO, communities, NGOs, Red Cross Society

Risks & Barriers

Long term maintenance of equipment or technical tools procured through external assistance is difficult and expensive and there might not be a budget allocation for this purpose;

Limited access to information relating to inputs for use in the early warning systems such as expensive satellite and GIS products;

High training costs;

Availability of the required skilled human resources;

Existence of institutional arrangements for incorporation of new activities and operational expenses.

Evaluation and Monitoring

Key Indicators:

Early warning system(s) with self-testing capabilities;

Reduced cost of damage to life-line infrastructure and other properties;

Reduced number of fatalities;

Evaluation and monitoring will be done through a project steering committee which will be chaired by Ministry of Agriculture.

COST

Early warning systems require sophisticated technology and tools, which are expensive to implement (e.g. Doppler radar that improves flash flood and tropical cyclone position forecasts). It is envisioned that for most early warning systems, a large portion of the cost will be sought through bilateral and multilateral aid projects.

Indicative Budget

Proposed Funding (Technical Assistance): USD 4.0 million

Activity	Costs (USD)
TROPICAL CYCLONES: Establish and install infra-red weather radar, real time high-resolution satellite imagery, weather radio frequencies for public and mariners, meteorological research	4 000 000
DROUGHT: Strengthen high-resolution GIS climate layers for Map Server, automated climate stations, applied climate research	250 000
FLOODING: Develop research and installation of infra-red weather radar, highresolution satellite imagery, telemetric rainfall and river gauges	250 000
TOTAL	4 500 000

The government will commit in-kind contributions in support of development projects that contribute to Samoa's development strategies, overall sustainable development goals and Millennium Development Goals.

SAO TOME E PRINCIPE

NAPA PRIORITY PROJECT NO. 2

INFRASTRUCTURE PROJECT 2

ESTABLISHMENT OF A SYSTEM OF CLIMATE ALERT

Location: (INM) Airport of S.Tomé
 Sector: Meteorology
 Domain: Economic
 Type: Adaptation to the Climate Changes

JUSTIFICATION

The meteorological forecast lacks of infrastructures and modern equipments, distributed by different stations of collects information and to be install for the whole Country. The national meteorological net should be rehabilitated from way to allow a systematic observation of the climate parameters.

The technical and human means available in the institution are insufficient, to allow them to fulfill its function of safeguard of human lives and goods. For the success of the established activity in the NAPA, the National Institute of Meteorology should be properly equipped and its staff adequately trained.

DESCRIPTION

Composition and activities

Disposal of infrastructures, human and technical means that guarantee the supply of information on time, permanently and credible.

To obtain information on the local and regional weather.

Objectives

To conceive a program in the radio, television and newspapers with permanent information;

To do meteorological forecasts;

To prevent the population, through a system of alert via radio or telephone, of the approach of a gale;

To sensitize the population to contribute in the maintenance of the infrastructures distributed by the several dispersed meteorological stations by the whole Country;

To give formation to the technicians on the new technologies in the domain.

Activities

To supply meteorological and credible information to the marine and aerial navigation;

To participate in events at local, regional and international level, to maintain the staff up dated;

To do the maintenance of the equipments and other infrastructures;

The marine and aerial navigation guarantee;

Forewarned population on any catastrophe, in advance;

Population sensitized.

Expected results

Equipments and infrastructures protected by the population.
Maintenance guaranteed.

Execution

The National Institute of Meteorology, in together with the Geographical Services, it will look for a land for construction of the central building.

The National Institute of Meteorology (INM) will take charge, together with DOPU, of the coordination and elaboration of the notebooks of responsibilities for work execution.

Institutional Framework

INM will proceed the order of the equipments.

INM will establish protocols in agreement with institutions as ENASA, ENAPORT, Direcção de Aviação Civil (Civil Aviation Direction), Direcção de Transporte e Comunicações, with reciprocal advantages about the air traffic and marine.

To find the wanted financing.

Risks and obstacles

To succeed in the population sensitization.

To provide information on time to the interested populations.

Indicators for Monitoring

Fishermen and other informed navigators about the weather situation, before the accomplishment of their trips.

Entrance of S.Tomé and Príncipe for the group of the Countries of the area that possess, for considerable periods, database the weather.

Duration

12 months

COST

USD 500 000

SIERRA LEONE

NAPA PRIORITY PROJECT NO 1

DEVELOP AN EARLY WARNING SYSTEM IN SIERRA LEONE

RATIONAL/JUSTIFICATION

In the recent past, unprecedented and extreme weather and climate hazards have been observed around the world and their effects have been known to be devastating. Such weather and climate hazards have destroyed lives of people, properties and livelihood of large communities. The environment has also been affected by such climate and weather types which include hurricanes (tornadoes, tropical cyclones), thunderstorms, droughts and floods. Now that it has been well established that the climate is changing, hazardous weather types are likely to affect various parts of the world and Sierra Leone is no exception.

It is therefore necessary that the Sierra Leone Meteorological Department be capacitated in order to properly monitor the climate and weather systems in the sub-region and in particular to be in position to give Early Warnings of imminent hazardous weather or climate.

Climate Change is known to have adversely affected the environment, Agriculture, Food Security, and even the lives and livelihood of large communities. Fishermen are known to have lost their lives in storms and passenger boats have encountered weather-related accidents – even though some go unreported. Flooding is known to have affected agriculture and habitats of people in Sierra Leone and their suffering aggravated by the attending health problems of water-borne diseases (typhoid, dysentery, cholera and diarrhea) due to lack of safe drinking water.

In the case of drought agriculture which the mainstay of many people in Sierra Leone will be disrupted, and so also is the early or delayed seasonal rains.

The Meteorological Department should be in position to give timely information on weather events likely to adversely affect the country and its people.

Having fore knowledge on future weather or climate events will help to minimize their negative effects on the people and the country.

DESCRIPTION

Objective

To build the capacity of the Sierra Leone Meteorological Department in order to enable it properly monitor the weather systems and climate and in particular to be in a position to provide Early Warning of Imminent Hazardous Weather or Climate.

To enable the Meteorological Department to give timely information on weather event that are likely to adversely affect the country and its people

Activities

The activities to be conducted will be geared towards putting back into operation the PUMA (preparation for the use of Meteorological satellite in Africa) station at the Lungi airport.

The PUMA station is the ground receiving station consisting of three dedicated computers with base programs to receive and process satellite cloud pictures, wind fields, water vapour content, ITD and other weather products for the purpose of detecting and monitoring weather systems for forecasting.

Before the installation of the PUMA station, a brief period of training of programme was conducted in South Africa for four operators of the PUMA equipment but due to low knowledge on computers the operation of the station has not been effective. Requests have been made for further training of operators and the upgrading of the system by the PUMA technicians but this exercise is yet to be addressed.

The activities to be conducted include the following:

- Adequately train the system operators.
- Invite the PUMA station technician(s) to re-visit the station and upgrade the system.
- Recruit and train weather observers
- Recruit and train weather forecasters
- Procure modern weather observation equipment/instruments.

Input

Human, Material and Financial Resources

Short-term output

- Rehabilitation of PUMA station at Lungi;
- Improvement in weather reporting for aviation purposes.

Potential long-term outcomes

- Establishment of Early Warning System for hazardous weather at the Lungi airport;
- Adequate number of trained and qualified weather observers and forecasters to man the Lungi Meteorological office on 24 – hour basis.

IMPLEMENTATION

Institution Arrangements

The Sierra Leone Meteorological Department will be the main executing agency. It will collaborate with other agencies such as the Sierra Leone Airport Authority (SLAA) the Sierra Leone Maritime Administration (SLMA), the Sierra Leone Ports Authority (SLPA), the Navy, the Environment and the Water Resources Departments, Sierra Leone roads Authority, the Potential Regional/International partners will include the world Meteorological Organization (WM), Roberts field Flight Information Region (FIR), International Civil Aviation Organization (ICAO) and the European Meteorological Satellite (EUMETSAT) in Africa, Organization of National Security and Civil Aviation.

Risks and Barriers:

Another risk is the inability to retain government employees of the Meteorological Department at the airport. They might develop low morale due to low remuneration as compared to parastatal employees who earn higher pay at the airport. The sustainability of the project is certain because after the provision of the various components mentioned in the budget breakdown, the maintenance and daily administrative cost of the Lungi Meteorological Office will be met by the Department's annual allocation from the central government.

Monitoring and Evaluation

The project will be monitored by competent agencies especially the SLAA and Civil Aviation.

A set of criteria will be developed to be used as tools for project evaluation.

COST

This project is estimated to cost USD 751,950

Budget Breakdown

	Year 1	Year 2	Year 3
Invitation of PUMA technician (s) to upgrade the system	75 600	39 900	25 400
Further training of five (5) system operators	62 450	54 500	34 000
Installation of internet, fax and radio telecomns.equipment	25 000	15 000	15 000
Modern weather observation Equipment/Instruments	40 000	28 000	16 000
Training of six (6) weather forecasters	180 000	45 000	45 000
Training of nine (9) weather observers	34 000	11 400	5 700
Total	417 050	193 800	141 100

SIERRA LEONE

NAPA PRIORITY PROJECT NO 20

ESTABLISHMENT OF A NATIONAL SEA-LEVEL OBSERVING SYSTEM FOR SIERRA LEONE

RATIONALE/JUSTIFICATION

Sierra Leone is highly vulnerable to any rise in sea-level because of its low-lying coastal areas. Some of these areas are presently being lost to the sea.

Local people will be vulnerable to accelerated sea-level rise. Their livelihoods and socioeconomic situation will be affected. Sea-level change will be an additional factor to the already scarce resources regime and environmental degradation and can increase the competition in resource use of the coastal area. Competition health will also be vulnerable as such a change will be reflected in the hydrological pattern of the area.

The establishment of a national permanent sea-level observing system is of immense environmental importance. It is even now urgent to establish such a system considering the threats to our coastal and marine environment posed by accelerated sea-level rise which is the result of global climate and human induced changes.

The installation of an operational, permanent sea-level observing station in Sierra Leone will make possible the observation of long-term sea-level fluctuations to provide data for practical scientific purposes. It will support educational programmes, national research and part operational activities. It will also create employment for youth as well as facilitating development for national research capacity in climate change and reduce poverty. It will also help to provide scientific data to ensure meaningful management practices of the country's coastal and marine environment.

Information about sea-level will assist safe navigation of vessels in and out of the country's main ports unloading and offloading activities; planning and implementation of coastline associated projects; design and construction of hydro-technical structures, marine resources exploration and exploitation etc.

DESCRIPTION

Objectives

- To have an operational permanent sea-level observing station for reporting monthly mean averages to the national marine meteorological service;
- To collect, analyze and make available data products for practical and/or scientific applications.

Activities

- Survey of construction site;
- Construction of support structure (pier or jetty) ;
- Construction of stilling well;
- Installation of tide gauge;
- Operation of the station;
- Training of personnel (workshops on managing of tide gauges) ;
- Training personnel on data collecting and analysis.

Short-Term output

- Tools for forecasting change in the coastal environment and socio-economic feedback;
- Mitigating measures for socio-economic problems arising from coastal ecosystem malfunctioning resulting from accelerated sea-level rise.

IMPLEMENTATION

Project will be overseen by a National Liaison (Project Management) Committee. Data collection and analysis will be undertaken by the University of Sierra Leone. Site station management will be the responsibility of the Ministry of Transport and Communications.

Risks and Barriers

- Inadequate financial resources;
- Inadequate trained personnel;
- Inadequate institutional capacity.

Monitoring and Evaluation

Monitoring and evaluation will be carried out by the competent independent agency.

COST

USD 180,000 (One hundred and Thirty Thousand Dollars)

Budget Breakdown

	Year 1	Year 2	Year 3
Site survey (bathymetry)	20 000	-	-
Building of support structure	30 000	-	-
Purchase of tide gauge	10 000	-	-
Purchase and construction of stilling well	20 000	-	-
Installation of the tide gauge	10 000	-	-
Operational costs for at least one year	60 000	-	-
Purchase of computer and accessories	20 000	-	-
Recruitment and training of a technician	10 000	-	-

SOLOMON ISLANDS

NAPA PRIORITY PROJECT NO. 2

CLIMATE CHANGE ADAPTATION ON LOW-LYING AND ARTIFICIALLY BUILT-UP ISLANDS IN MALAITA AND TEMOTU

Goal

The main goal is to facilitate adequate adaptation to climate change and sea-level rise

Rationale

While most communities are making every effort to deal with and cope with the changes resulting from climate change, variability and extreme events, there are some communities who have very limited opportunities for adaptation to climate change. These areas include Langalanga, Kwai, Ngongosila and Lau where most of the settlements are built on water. Others include the low-lying atoll islands of Ontong Java, Sikaiana, and Reef Islands. The settlements built on water depend almost entirely on rainwater and the supply of materials and resources such as mangrove for timber and firewood and sago palms for construction are in decline. In other low-lying atolls the vagaries of climate change and sea-level rise are putting additional pressure on limited resources.

The adverse impacts of climate change, climate variability and extreme events are manifested in the various changes that people experience and some adaptation effort is already being undertaken as a matter of course (outlined above). However many communities and/or villages have indicated that in order for them to better understand the adverse impacts of climate change and be able to make informed decisions about adaptation it is vitally important the climate change education, awareness-raising and information dissemination becomes part of long-term adaptation effort in the Solomon Islands.

Most communities and/or villages depend on subsistence activities for their livelihood. However increasing demand for material goods and services in a modern growing economy makes cash income opportunities necessary. Thus any adaptation measure, option and strategy will necessarily include income-generating opportunities and the infrastructure to support such effort. For example, Solomon Islanders depend entirely on road and sea transport to move their produce to market. If heavy and intense rains and sea storminess continues as often as it is being experienced now the ability of people to move their produce to market is seriously compromised.

Description

The NAPA process has identified the low-lying and artificially built-up islands as being the most vulnerable to climate change and sea-level rise. As indicated in Project Profile 1, Component 3, many of these communities and/or villages live on or at the edge of the sea and are often subject to impacts of storms, storm surge, sea-level rise, drought, saltwater intrusion, and flooding. For most of these communities relocation is a potential adaptation measure. However, relocation is problematic when they do not own land resources on nearby islands thus land tenure and land management systems prohibit any discussion let alone relocate to nearby islands. For example, Langalanga people cannot move to nearby island where they do not own land and its resources.

Relocation of communities and/or villages will necessarily become the responsibility of the governments at all levels (i.e. community/local, provincial and national).

Objective: To develop and implement plans to relocate as an adaptation measure.

Outcome 1: Develop and implement plans for relocation of communities

Outputs:

- 1.1 Capacity-building for adaptation planning conducted.
- 1.2 Vulnerable communities and government authorities consulted.
- 1.3 Land and resources owners consulted.
- 1.4 Plans for new settlements prepared and approved.
- 1.5 Communities and/or villages relocated.
- 1.6 Dialogue between the migrants and land and resource owners strengthened.

Implementation – see Chapter VII.

Sustainability of the programme

Distribution of lands currently do not account for the impacts of climate change and sea level rise. However, from the analysis of human settlements, relocation of communities will become one of the few practical options (if not the only one) for adaptation to climate change by communities and/or villages residing on houses built over the sea and low-lying atolls. There is currently no legislation or a legal framework which would allow climate change-affected communities to relocate. Thus relocation will require specific legislation and a legal framework to guide the process at every level of government.

The biggest risk is that land owners and resources owners may not agree to the terms and conditions of relocation and also may claim compensation to the amounts that could be prohibitive for the government. It is therefore imperative to engage the relocating people and the resource owners at the very early stage of planning. Such engagement and continuous dialogue will ensure the long term sustainability of this programme.

Budget

It is expected that an amount of USD 3,500,000 million will be requested from the LDCF to fund this programme. Co-financing will be sought from other development partners and the government budgetary support.

TUVALU

NAPA PRIORITY PROJECT 6

STRENGTHENING COMMUNITY DISASTER PREPAREDNESS AND RESPONSE POTENTIAL

Type of project: Intervention (with community focus)

RATIONALE

The vulnerability of Tuvalu to natural disasters is high. Climate change increases the frequency of natural hazards. There is the likelihood of a trend in increasing frequency of climate hazards in Tuvalu (Table 11 of NAPA). Losses from major disasters can be high (as defined in Table 1 of NAPA) and also low (as described in NAPA Section 4.1 on the evacuation of king-tide victims in 2006 under the Disaster plan). It is important to reduce risk from disaster and to increase community preparedness and response. The communities should also be aware of the disaster plan and its execution during and after disaster due to the increasing trend of climate hazard frequency (as highlighted in tables 5, 10 and 11 of NAPA). Public awareness and traditional knowledge are also useful in enhancing community preparedness to disasters. Increased flow of public friendly climate information will increase community understanding on preparedness and response to disasters. Increasing climate monitoring in Tuvalu will enhance community preparedness for disasters.

DESCRIPTION

Goal

Strengthening of Community Disaster preparedness and response capability

Objectives

There are two objectives for this project as follows:

- To ensure community preparedness and effective response to disasters;
- To ensure that climate hazard risks on island communities are reduced.

Outcomes	Activities
1. Community disaster preparedness and response enhanced	Activities will include: Developing a post-disaster resettlement and rescue plan; Awareness raising on existing disaster plan; Developing a disaster preparedness and response strategy; Enhancing and documenting traditional knowledge.
2. Climate hazard risks reduced	Activities will include: Integration of risk reduction into national development; Disaster risk reduction training.
3. Increased climate monitoring and information	Activities will include: Establishment of new Automatic Weather Stations (AWS); Developing stakeholder-friendly climate information; Developing early warning systems.

Short-term outputs

- Risk reduction integrated into national development;
- Community Disaster Awareness enhanced.

Potential long-term outcomes

Preparedness and Response to disasters strengthened;
 Community's perceptions of the level of risk they face increased;
 Decreased economic losses associated with disasters;
 Community climate understanding enhanced.

IMPLEMENTATION**Institutional arrangement**

Primary executing agencies: National Disaster Management Office (NDMO), DOE and Tuvalu Meteorological Services.

Secondary implementing agencies: NGOs, CBOs and Kaupule.

Risks and barriers

Lack of financial resources;
 Lack of human resources capacity;
 Limited lands.

Evaluation and monitoring

Quarterly Reporting;
 Annual Project Report.

COST

The total cost for this project is

USD 462,000.00

Budget Breakdown

An indicative and tentative financial resource estimate for the activities is provided below:

Activities	Year 1	Year 2	Year 3
Develop a post-disaster resettlement and rescue plan	15 000		
Awareness raising on existing disaster plan	15 000	45 000	10 000
Develop a Disaster preparedness and response strategy	15 000		
Documenting Traditional Knowledge	10 000	6 000	6 000
Integration of risk reduction into national development	5 000	10 000	10 000
Disaster Risk Reduction training	45 000	10 000	5 000
Establishment of new AWS	60 000	60 000	60 000
Develop stakeholder-friendly climate information	10 000	10 000	10 000
Develop early warning systems	15 000	10 000	5 000
Contingencies	5 000	5 000	5 000
Sub-Total	195 000	156 000	111 000
Total Cost			462 000

UGANDA

NAPA PRIORITY PROJECT NO. 3 STRENGTHENING METEOROLOGICAL SERVICES

JUSTIFICATION

Climate is Uganda's most valuable natural resource. It is not a mere natural resource, but a key determinant of the status of other natural resources such as water, land, plants and animals, on which the economic and social development of Uganda depends. Therefore, changes in Uganda's climate are translated directly to its economic and social performance.

In the past, communities knew their local climate well and it was predictable. Annual seasonal variations, particularly the onset and cessation of rains were minimal. Therefore, weather and seasonal forecast did not make any difference and indeed climate prediction could be based on relatively few climate-observing stations. Today, under climate change, the situation is radically different because there is increased climate variability, and frequency and intensity of weather and climate events. Therefore, strengthening meteorological services to provide weather and climate information to the vulnerable communities is crucial.

DESCRIPTION

Objectives

The main objectives of the intervention are to improve:

- Data collection and strengthen technical capacity;
- Availability, accuracy and timeliness of weather and climate information and its use by the vulnerable communities.

Activities

The key activities of the intervention include:

- Expand and maintain weather and climate observing network;
- Strengthen data collection, processing, analysis and interpretation;
- Strengthen human capacity in weather observing, forecasting and information management;
- Scale up information management and communication system;
- Strengthen early warning system and its coordination mechanism;
- Develop and package weather and climate information for vulnerable communities;
- Sensitize communities on weather and climate information use;
- Disseminate and promote use of weather and climate information;
- Develop partnerships and synergies with media and other stakeholders;
- Monitor and evaluate utilization of weather and climate.

Inputs

The inputs include: human resources, equipment (meteorological instruments, communication equipment, logistics to enable installation and maintenance of field equipment), technical assistance and financial resources.

Short-term outputs

- Effective and adequate climate observing network;

Skilled and effective human capacity in climate management;
 Functional and effective early warning system;
 Increased use of weather and climate information by communities.

Potential long-term outputs

Accurate and timely provision of weather and climate information;
 A community-based climate information distribution and management system.

IMPLEMENTATION

The Ministry of Water, Lands and Environment will be the official recipient and the focal point will be Department of Meteorology to implement the project in close collaboration with key stakeholders such as local governments and civil society

Risks and barriers

Civil conflicts;
 Natural hazards and disasters;
 Limited knowledge of tree growing;
 Insufficient funding.

Evaluation and Monitoring

The project will be evaluated every two years by a tripartite constituted by the Government of Uganda and relevant development partners. The project management will produce regular reports in accordance with the laid down monitoring plan of the project.

Time Frame

A period of 3-5 years is planned. Since there is an urgent need for adaptation to climate change, it should commence immediately.

FINANCIAL RESOURCES

NAPA implementation will require financial resources from the Government of Uganda, Bi-laterals, Multilaterals, NGOs and CBOs. Financial Requirements will include but not be limited to: costs of training of communities, construction works, technology development, facilitation of project component personnel, production of manuals, stationeries, computers and other office accessories.

Estimated total project cost is USD 6,500,000

ZAMBIA

NAPA PRIORITY PROJECT 1

APPENDIX II: NAPA OPTION 2

STRENGTHENING OF EARLY WARNING SYSTEMS TO IMPROVE SERVICES TO PREPAREDNESS AND ADAPTATION TO CLIMATE CHANGE

RATIONALE/JUSTIFICATION

Over the years climatic data has been provided to the Ministry of Agriculture and Cooperatives and Civil Aviation. The data provided to MACO has not been provided in a user friendly manner such that those that need this information do not get the full benefit of it at all. If Climatic data can be provided to all stakeholders in a manner that is easily usable by them a lot of the impact of climatic calamities that affect the country could be reduced.

It has also been shown that the health delivery system suffers from inadequate distribution of medical facilities, shortage of medical drugs and congestiomedical facilities during times of epidemics. In this country, epidemics are usually underway before the authorities are notified and epidemic control put in place. All these shortcomings translate into high morbidity and mortality amongst Zambians. It is, however, known that the early identification of epidemics permits adequate planning and implementation of effective interventions to control the disease and reduce the resulting morbidity and mortality in the human population. It has been demonstrated elsewhere (WHO, 2005) that climate information can be used to improve epidemic prediction and therefore has potential to improve disease control. In fact the Integrated Disease Surveillance and Response (ISDR) programme of Zambia under the Ministry of Health is intended to strengthen the country's capacity to conduct effective surveillance for both communicable and non-communicable diseases through integrated collection and improved monitoring systems. This project aims to complement the activities of ISDR with the purpose of ensuring timely and effective preventive measures (ITNs and insecticides) and medicines in the affected areas.

It is therefore important to strengthen early warning services and advance planning for periods of adverse climate variations in a form suited for practical application by users at all levels including local communities.

DESCRIPTION

Overall Objective

Develop the use of compatible standards and systems; encompassing relevant data and stations; including remote areas; use and disseminate modern technology for data collection, transmission and assessment.

Strengthening systematic observations of meteorological and hydrological services, and capacity building, education and public awareness.

Activities

- Develop infrastructure for early warning advanced planning purposes;
- Establishment of a National Climate Centre;
- Collect the required climate, environmental and health data;

Conduct field surveys in representative localities to identify climatic and non climatic disease risk factors;
 Establishment of an effective climate data management system;
 Human capacity for regular monitoring of climate stations for data quality;
 Devise an effective information dissemination process to all sectors that may be affected by climate change.

Inputs

Research personnel, field survey maps, GIS software, satellite imageries, Digital camera

Short-Term Outputs

Infrastructure made operational;
 Physical presence;
 Systems put in place;
 Monthly/Annual reports;
 Climate based early warning system for diseases.

Potential Long-Term Outputs/Outcomes

Infrastructure developed;
 National Centre constructed;
 Systems developed;
 Human capacity developed;
 Dissemination information system developed;
 Reductions in morbidity and mortality of the affected populations and timely supply of medical drugs.

IMPLEMENTATION

Institutional Arrangement

The lead organization will be the ZMD and will be supported by researchers and personnel from the Health, Disaster Management and Mitigation Unit (National and District levels), Central Statistical Office, Universities/Research Institutions and NGOs. The Ministry of Health can even integrate this project into its Integrated Disease Surveillance programme and use the Epidemic Preparedness Committees to spearhead this project at national, provincial, district and community levels. The lead institution has to be the ZMD. Other collaborative institutions include MACO, MTENR, MOH, Research institutions.

Risks and Barriers

There are no major barriers and risks anticipated except for possibly the availability of financial resources and satellite imageries, as well as the usual coordination difficulties associated with multi-stakeholder/disciplinary projects.

Evaluation and Monitoring

The lead organization will establish monitoring and evaluation protocols based on indicators for assessing the performance and impact of the project. It is also important to evaluate the cost-effectiveness of this intervention.

COST

USD 1,800,000