



## NATIONAL ADAPTATION PROGRAMMES OF ACTION

### Summary of Projects on Infrastructure identified in Submitted NAPAs as of September 2008

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# BANGLADESH

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## NAPA PRIORITY PROJECT NO. 8

### ENHANCING RESILIENCE OF URBAN INFRASTRUCTURE AND INDUSTRIES TO IMPACTS OF CLIMATE CHANGE INCLUDING FLOODS AND CYCLONE

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#### TYPE OF PROJECT

Capacity building (with policy and awareness raising elements)

#### ACTIVITIES

- Specification in National Building Code for building industry and infrastructure in potentially vulnerable areas;
- Community based safe dumping place of pollutants.

#### RATIONALE

Urban infrastructure in the major cities of the country will be adversely affected by climate change impacts, especially floods and cyclones. These need to be made more resilient to withstand those impacts.

#### DESCRIPTION

##### Objectives and activities

- To enhance resilience to climate change (including floods and cyclones) in urban and industrial sectors in the major cities

##### Inputs and Activities

- Development of better building codes for buildings;
- Development of better waste management for industries;
- Development of better warning systems.

##### Short-term outputs

- Greater understanding of climate change impacts and enhanced awareness and readiness in urban and industrial sectors

##### Potential long-term outcomes

- Enhanced resilience of urban and industrial infrastructure to the impacts of climate change.

#### IMPLEMENTATION

##### Institutional arrangement

Primary implementing agency: DOE

Secondary implementing agencies: HBDC, Min of Industries, FBCCI, DCCI,

##### Risks and barriers

- Lack of understanding and awareness of the climate change issues within the concerned agencies

##### Evaluation and monitoring

- Through a multi-sectoral multi-stakeholder review committee

**COST**

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

*Full project: USD 2,000,000*

*Design phase: USD 25,000*

# CAMBODIA

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## NAPA HIGH PRIORITY PROJECT 1A (NON-HEALTH) REHABILITATION OF A MULTIPLE-USE RESERVOIR IN TAKEO PROVINCE

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### SECTOR

Agriculture and Water Resources

### RATIONALE

Due to sedimentation, frequent floods and lack of maintenance, the reservoirs storage capacities have significantly decreased, resulting in water shortage for irrigation and poor water quality in the dry season. In addition, prolonged droughts occurring in recent years have further decreased water availability for households and irrigation. The project aims to increase the storage capacity of the reservoir by 3 million m<sup>3</sup>.

### DESCRIPTION

#### Objective

- To improve water storage capacity for multiple uses including irrigation, water supply for urban areas, recreational uses and enhanced aquatic biodiversity.

#### Activities

- Dredge the reservoir;
- Repair a dike and a water gate; and
- Establish reservoir maintenance scheme.

#### Short-term outputs

- 3 million m<sup>3</sup> of soil removed from the 100 ha reservoir;
- 1,200 m dike repaired; and
- 1 water gate repaired.

#### Potential long-term outcomes

- 750 ha of dry season paddy fields and 150 ha of wet season paddy fields irrigated;
- Fish stock in the reservoir increased;
- Agricultural production increased; and
- Water quality for Takeo City improved.

#### Location

The project will be implemented in Takeo Province (Takeo Town, Doun Kaev District).

#### Time frame

3 years.

### IMPLEMENTATION

#### Institutional arrangement

MOWRAM will be the lead agency in coordination with MoE, MAFF, MIME and MRD.

**Risks and barriers**

Insufficient coordination among concerned ministries/institutions.

**Evaluation and monitoring**

The following indicators will be used: water storage capacity, length of dike repaired, and a gate repaired.

**RELATED DEVELOPMENTS**

This is a new initiative.

**COST**

*USD 4,000,000.*

# CAMBODIA

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## NAPA HIGH PRIORITY PROJECT 1B (NON-HEALTH) REHABILITATION OF MULTIPLE-USE DAMS IN TAKEO AND KAMPONG SPEU PROVINCES

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### SECTOR

Agriculture and Water Resources

### RATIONALE

A system of dams were built in the 1970s in Kampong Speu Province to retain runoff water from nearby mountains and to control flood. These dams have played a crucial role in rice production and water supply for rural communities in Samraong District (Takeo Province) and Basedth District (Kampong Speu province). By 1983, one of the main dams, named Slapleng, was disused due to damage caused by frequent floods and improper maintenance.

As a result, storage capacities have significantly decreased, resulting in water shortage for irrigation and household use in the dry season. In addition, areas of rice fields that can no longer be cultivated continue to expand due to increasing sand sedimentation by flash floods every year.

### DESCRIPTION

#### Objectives

To improve water management for multiple uses including irrigation, water supply rural communities, recreational uses and aquatic biodiversity enhancement.

#### Activities

- Reconstruct Slapleng dam and repair other dams as required;
- Repair irrigation canal systems, water gates;
- Remove sand deposits from rice fields;
- Establish dam maintenance scheme;
- Reforest Slapleng watershed; and
- Explore options for reforestation of other watersheds.

#### Short-term outputs

- 1 dam reconstructed;
- 2 dams repaired;
- Irrigation canal systems and water gates repaired;
- 100 ha of rice fields freed from sand deposits;
- Dam maintenance scheme established;
- 1 watershed reforested; and
- Options for watershed reforestation recommended.

#### Potential long-term outcomes

- 500 ha of dry season paddy fields irrigated;
- Fish stock in the reservoir increased;
- Agricultural production increased;
- Forest and non-timber forest products available; and

- Water quality and water supply for rural communities improved.

**Location**

The project will be implemented in Takeo Province (Samraong District) and in Kampong Speu Province (Basedth District).

**Time frame**

2 years.

**IMPLEMENTATION****Institutional arrangement**

MOWRAM will be the lead agency in implementing this project in coordination with MoE, MAFF, MRD and local authorities.

**Risks and barriers**

Insufficient coordination among concerned ministries/institutions, limited information about local hydrology.

**Evaluation and monitoring**

The following indicators will be used: water storage capacity, length of dam and canals repaired, number of water gates repaired and constructed, areas of rice fields freed from sand deposits, rice production.

**RELATED DEVELOPMENTS**

Minor repairs have been conducted since the 80th by local authorities. MOWRAM plans to undertake a detailed study of this project.

**COST**

*USD 2,500,000.*



# CAMBODIA

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## NAPA HIGH PRIORITY PROJECT 2A (NON-HEALTH) DEVELOPMENT AND REHABILITATION OF FLOOD PROTECTION DIKES

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### SECTOR

Agriculture and Water Resources

### RATIONALE

Many existing flood protection infrastructures are not fully functional and require rehabilitation. The lack of adequate protection makes settlements and agricultural fields vulnerable to floods. Under changing climatic conditions, the frequency and intensity of floods may increase. It is therefore essential that adequate protection infrastructures be developed.

### DESCRIPTION

#### Objective

- To protect settlements and agricultural fields from flood.

#### Activities

- Identify priority sites for flood protection infrastructure development;
- Develop and rehabilitate flood protection dikes; and
- Establish community associations for maintenance.

#### Short-term outputs

- 200 km of flood protection dikes developed.

#### Potential long-term outcomes

- Settlements and agricultural fields protected from flood;
- Agricultural productivity increased; and
- Poverty reduced.

#### Location

The project will be implemented in the following provinces: Battambang (Moung Ruessei District), Kampong Cham, Kandal (Kandal Stueng, Khsach Kandal, Ponhea Lueu, Lvea Aem, Kien Svay, Kaoh Thum, S'ang and Leuk Daek Districts), Kratie, Pursat (Sampov Meas, Bakan, Phnum Kravanh and Kandieng Districts), Svay Rieng (Svay Rieng District), and Sihanoukville Municipality (Prey Nob District).

#### Time frame

3 years.

### IMPLEMENTATION

#### Institutional arrangement

MOWRAM will implement the project in collaboration with MPWT, local authorities and NGOs.

**Risks and barriers**

Insufficient coordination among concerned ministries/institutions, limited participation of local communities, land use conflict, limited hydrological data.

**Evaluation and monitoring**

The following indicators will be used: kilometres of dikes developed, number of communities participating in associations.

**RELATED DEVELOPMENTS**

MOWRAM has developed flood protection structures in a number of provinces.

**COST**

*USD 5,000,000.*

# CAMBODIA

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## NAPA HIGH PRIORITY PROJECT 2B (NON-HEALTH) REHABILITATION OF UPPER MEKONG AND PROVINCIAL WATERWAYS

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### SECTOR

Agriculture and Water Resources

### RATIONALE

In recent years, Cambodia has experienced frequent floods, which are believed to be caused by climate change. The upper Mekong and provincial waterways are essential for flood mitigation, provision of fertile silts for farming lands, fisheries, provision of water for irrigation and household consumption, and for transportation. Currently, a number of waterways along the upper Mekong and waterways in the provinces of Svay Rieng, Prey Veng, Pursat and Koh Kong are silted, and have become too shallow, resulting in significant reduction of flood water absorbing capacity, losses of fishery resources, decreasing agricultural yields, and limits to transportation.

### DESCRIPTION

#### Objectives

- To reduce risks caused by Mekong floods;
- To improve fishery resources;
- To improve rural livelihoods by supplying sufficient water for irrigation and domestic uses;
- To improve provincial water transportation.

#### Activities

- Identify and select waterways to be rehabilitated;
- Conduct feasibility studies of the selected projects;
- Rehabilitate identified waterways; and
- Train staff of local authorities on maintenance and management of waterways.

#### Short-term outputs

- 5 main waterways along the upper Mekong rehabilitated;
- 3 provincial waterways of a total length of 100 km rehabilitated; and
- Local authorities staff trained in maintenance and management of waterways.

#### Potential long-term outcomes

- Agricultural productivity and fishery resources increased;
- Water transportation improved; and
- Poverty reduced.

#### Location

The project will be implemented in the provinces along the upper Mekong, Koh Kong, Prey Veng, Pursat, and Svay Rieng.

#### Time frame

3 years.

### IMPLEMENTATION

#### **Institutional arrangement**

MOWRAM will implement the project in collaboration with MPWT and local authorities.

#### **Risks and barriers**

Potential land use conflict, adverse environmental impacts, lack of community participation.

#### **Evaluation and monitoring**

The following indicators will be used: length of waterways rehabilitated, increase of fishery resources, agricultural land irrigated, cropping index, waterway traffic.

### RELATED DEVELOPMENTS

Provincial waterways rehabilitation has been carried out by MOWRAM with support from ADB, JICA and WB in Banteay Meanchey, Battambang and Kampong Speu Provinces.

### COST

<i>USD 30,000,000.</i>
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# CAMBODIA

## NAPA HIGH PRIORITY PROJECT 2C (NON-HEALTH) REHABILITATION OF MULTIPLE-USE CANALS IN BANTEAY MEAS DISTRICT, KAMPOT PROVINCE

### SECTOR

Coastal Zone

### RATIONALE

A seven-kilometre dike and two canals on both sides of the dike were built under the Khmer Rouge to irrigate the rice fields in Prey Tonle Village, Banteay Meas District. The dike has been used as a road and a flood refuge. The canals have been used for irrigation, navigation, and to provide freshwater for household use and livestock raising. The canals, which are also affected by seawater intrusion and high tide, require rehabilitation; the water gates also need repair. Rules governing the use of the gates and canals need to be established.

### DESCRIPTION

#### Objective

- To enhance water storage capacity for general use in the village during the dry season.

#### Activities

- Rehabilitate the canals and the dike;
- Repair the gates;
- Establish water utilisation groups and fee collection for maintenance and operations.

#### Short-term outputs

- Two canals, seven kilometres in length rehabilitated;
- A dike rehabilitated;
- A water utilisation group established.

#### Potential long-term outcomes

- Access to water improved;
- Poverty reduced.

#### Location

The project will be implemented in Kampot Province (Prey Tonle in Banteay Meas District)

#### Time frame

1 year. The canal and dike rehabilitation should be undertaken during the dry season.

### IMPLEMENTATION

#### Institutional arrangement

The project will be coordinated by MOWRAM and implemented by concerned NGOs in collaboration with local authorities.

**Risks and barriers**

Land use conflict, weak social capital in local communities, and limited data on local hydrology and geology.

**Evaluation and monitoring**

The following indicators will be used: canals, dike and gates rehabilitated and functioning, and water user group established.

**RELATED DEVELOPMENTS**

In Kampot, the construction of wells and ponds has been undertaken with the assistance of FAO, Food for Hunger, UNICEF and the World Food Programme. However, most of the assistance covered areas further inland where groundwater sources are available. In Kep, ponds have been constructed. Most of the projects were undertaken between 1985 and 2000.

**COST**

*USD 1,500,000*

# CAMBODIA

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## NAPA HIGH PRIORITY PROJECT 3C (NON-HEALTH) WATER GATES AND WATER CULVERTS CONSTRUCTION

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### SECTOR

Agriculture and Water Resources

### RATIONALE

The road network of Cambodia has been rehabilitated in recent years without due consideration for hydrological aspects. This has resulted in the disruption of natural flooding patterns, causing increased damage to agricultural crops and infrastructure.

### DESCRIPTION

#### Objectives

- To regulate flood water around the newly rehabilitated road network;
- To minimise road and crop damage caused by flood.

#### Activities

- Identify areas affected by flood subsequent to road rehabilitation;
- Install water gates and water culverts.

#### Short-term outputs

- Water gates and water culverts installed along the road network;
- Flood regime regulated;
- Agricultural productivity increased;
- Damage to road network reduced.

#### Potential long-term outcomes

- Water-related diseases reduced;
- Poverty reduced.

#### Location

The project will be implemented in the following provinces: Banteay Meanchey (Mongkol Borei District), Kampong Cham, Kandal (Khsach Kandal, Ponhea Lueu, Lvea Aem, Kien Svay, Kaoh Thum, S'ang and Leuk Daek Districts), Kratie, Prey Veng (Kampong Trabaek, Preah Sdach and Peam Ro Districts), Siem Reap (Srei Snam, Angkor Chum, Varin, Banteay Srei and Svay Leu Districts), Svay Rieng (Svay Rieng District), and Takeo (Kaoh Andaet District).

#### Time frame

The time frame for the project is 2 years. The project construction phase should start at the beginning of the dry season.

### IMPLEMENTATION

#### Institutional arrangement

MPWT and MOWRAM will coordinate the project and MPWT Provincial Departments will implement it in collaboration with local authorities in the selected districts.

**Risks and barriers**

Insufficient coordination among concerned ministries/institutions, potential land use conflict, and limited long-term data on flood.

**Evaluation and monitoring**

The following indicators will be used: number of gates and culverts installed, reduction of damage to agriculture.

**Related developments**

The construction of water gates and culverts has been undertaken by the Cambodian Farmer Association for Agriculture Development in Svay Ta Yean commune (Kampong Rou District), Prey Ankunh Commune (Chantrea District) in Svay Rieng Province. Construction of water culverts has been carried out by NCDM in Kandieng District (Pursat), Romeas Haek District (Svay Rieng), Odongk District (Kampong Speu), and Lvea Aem District (Kandal).

**COST**

*US \$10,000,000.*



# CAMBODIA

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## NAPA HIGH PRIORITY PROJECT 3G (NON-HEALTH) REHABILITATION OF COASTAL PROTECTION INFRASTRUCTURE

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### SECTOR

Coastal Zones

### RATIONALE

Many of the existing earth dikes that protect agricultural land in coastal areas were built prior to the 1960s. These dikes have been damaged by harsh environmental conditions and the lack of proper maintenance leaving land exposed to seawater intrusion and making it unsuitable for agriculture. Coastal areas do not produce sufficient rice for local consumption. The restoration of the dikes would enable the rehabilitation of farmland and improve food security, in turn strengthening capacity to adapt to climate change.

### DESCRIPTION

#### Objective

To increase agricultural production in coastal areas.

#### Activities

- Assess coastal protection structures for agricultural land to determine rehabilitation potential;
- Rehabilitate priority small-scale protection structures;
- Establish user association for operations and maintenance.

#### Short-term outputs

- 10 small-scale coastal protection infrastructures rehabilitated;
- 10 user associations established;
- Rehabilitation potential of coastal protection structures for agricultural land assessed.

#### Potential long-term outcomes

- Agricultural production increased;
- Food security improved;
- Poverty reduced.

#### Location

The project covers all coastal provinces and municipalities: Kampot, Koh Kong (Srae Ambel, Botum Sakor Districts), Kep and Sihanoukville.

#### Time frame

2 years.

### IMPLEMENTATION

#### Institutional arrangement

MOWRAM will coordinate the project and MOWRAM's Provincial Departments and concerned NGOs will implement it in collaboration with local authorities.

**Risks and barriers**

Land use conflict, limited community participation, and weak sense of ownership.

**Evaluation and monitoring**

The following indicators will be used: number of dikes rehabilitated, number of user associations established and functioning.

**RELATED DEVELOPMENTS**

MOWRAM's Provincial Departments in Koh Kong Province and Sihanoukville Municipality have identified damaged coastal protection structures and initiated limited repairs in selected locations. A sea dike in Kandaol, Koh Kong Province, was rehabilitated using loan from the World Bank. GRET has repaired the Prey Nob polder in Sihanoukville Municipality and operates it with local communities.

**COST**

*USD 2,000,000.*

# COMOROS

NAPA PRIORITY PROJECT NO. 7

PROJECT SHEET NO. 7

USE OF NON-METALLIC LOCAL MATERIALS FOR THE CONSTRUCTION  
OF LOW PRICE HOUSING

## SECTOR OF INTERVENTION

Infrastructures

### RATIONALE

About 30 to 40%, 50 to 60% and 25 to 30% of the Comorian families respectively in Grand-Comoro, Anjouan and Mohéli live in cob or straw houses with a woody framework, which are vulnerable to bad weather (MICS surveys 2000).

The increase trend of the frequency of cyclones and other extremes of climate events recorded over the past few years has already led to significant material losses and is likely to jeopardise the life of many families.

Indeed, 30% of the constructions are made of concrete and semi-concrete and 70% are made of light structure and are therefore precarious. Access to concrete housing is limited to privileged families, due to the high cost of this method of construction. Whereas straw constructions must be renewed every year, concrete ones made of clay materials better resist the rain and have life duration of several decades.

The outcomes of the census conducted in 1991 forecast, between 1991 and 2010, an evolution of the number of houses estimated at 246.977, in relation with the population growth projections for this period.

The use of new materials produced locally will lead to a significant decrease of the construction costs and facilitate the access of the poor populations from the risky areas, to more resistant and decent housing.

It will therefore enable to improve the security of these populations and housing comfort as well as the hygiene conditions through the local production of sanitary made of these materials.

The proposed project constitutes one of the actions to be implemented in order to contribute to the security of the population, in the face of extremes of climate events, the preservation of enough forest cover, which is necessary for the preservation of soils and river aquifers and biodiversity, as well as climate balance.

### ZONES OF INTERVENTION

Gnومachioi, Wanani, Siri-Ziroundani (Mohéli); Dadji, Koni, Bandrani (Anjouan); Pimba, Ivoini, Sadani, Dimani/Oichili, Itsandra (Grand-Comoro)

### LINKS WITH ONGOING OR PROJECTED PROGRAMMES AND MULTILATERAL AGREEMENTS

Poverty Reduction and Growth Strategy Paper (PRGSP) (PRSP);  
United Nations Housing Programme;  
Convention on biodiversity;  
Convention on the fight against Desertification;

## Environmental Action Plan.

### RECIPIENTS

The entire population living in precarious houses

### DESCRIPTION

#### Objective

Reinforce the resistance of traditional housing in order to increase people security, in the face of extremes of climate events and improve the comfort and the hygiene conditions of the households.

#### Activities

- Studies on impact on the environment;
- Crushing of puzzolonic materials (the inventory of which had already been made and tested);
- Manufacture of consolidated clay bricks;
- Research and adjustment of relevant technological procedures;
- Training;
- Support to the creation of private enterprises in the sector of ceramics.

#### Inputs

- Equipment, measuring tools and laboratory equipment (geology, geophysics, geochemistry geotechniques, computer and office materials, calculation software, documentation, vehicles).
- Pool of construction material.
- Crushing equipments, chargers and transportation materials.
- Presses, mixers, shovel tractors and other tools costs;
- Human resources;
- Financial resources.

#### Short term outputs

- Creation and operationalisation of centres for the production of the materials;
- Creation of units for the manufacture of consolidated clay bricks;
- Increase of the construction in concrete and progressive elimination of traditional housing in cob or straw;
- Reduce or avoid losses in human lives during extremes of climate,
- Reduce the cost of the construction of low cost housing;
- Improve housing hygiene conditions and comfort.

#### Long term outputs

The project will contribute to:

- Reduce the use of timber for construction and reduce deforestation;
- Reduce sand and coral mining for construction thus reducing coastal erosion;
- Favour the emergence of entrepreneurs in the sector of ceramics;
- Create jobs and ensure training;
- Reduce rural exodus;
- Favour the global equilibrium of the islands.

## IMPLEMENTATION

### **Institutional arrangement**

The project will be carried out by a multisectoral pilot committee in each island, under the supervision of the Island Ministry of Environment, with the support of the national laboratory for Public Works, under the coordination of the Union Ministry of Environment.

### **Risks and barriers**

The lack of enough architects to propose more attractive construction plans, the substantial decrease of the cost of construction and the possible lack of enough dissemination of technical procedures and the education of the population in the use of baked or consolidated bricks could constitute possible risks and obstacles to the success of the project.

### **Follow-up and evaluation indicators**

- Availability of puzzolanic materials for construction;
- Availability of consolidated clay bricks;
- Level of support of the population in the use of local construction materials;
- Number of built houses;
- Diminution of traditional cob or straw housing;
- Spared lives during extremes of climate events;
- Regeneration of beaches and forests.

### COST

<i>USD 1,025,000</i>
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# DJIBOUTI

## NAPA PRIORITY PROJECT NO. 8

### PROMOUVOIR DES MESURES ADAPTÉES DE PROTECTION DES OUVRAGES D'ALIMENTATION EN EAU DE LA VILLE DE DJIBOUTI

#### BUT DU PROJET

Sécurisation de l'alimentation en eau pour réduire la vulnérabilité de la ville de Djibouti aux changements et variabilité climatiques

#### DESCRIPTION DE LA SITUATION ACTUELLE DU SITE DU PROJET

##### Contexte physique de la zone du projet

La ville de Djibouti est alimentée en eau à partir d'une nappe souterraine située dans la plaine sédimentaire littorale à environ 6 km entre Djibouti et le village de Loyada, à la frontière somalienne. La plaine en pente douce est traversée par plusieurs oueds (Ambouli, Douda, Damerjog) dont les eaux de crues rechargent la nappe souterraine avant de se jeter dans la mer. L'aquifère exploité, situé dans des formations basaltiques fissurées, a une structure dynamique complexe. Entre la nappe de Djibouti et la mer s'intercalent des formations sédimentaires contenant une nappe semi-captive qui joue un rôle de tampon hydraulique. La recharge de la nappe de Djibouti, entièrement dépendante des précipitations, est estimée à 15 millions de m<sup>3</sup>/an alors que les prélèvements sont de 13 millions de m<sup>3</sup>/an. Les forages d'exploitations, répartis de manière hétérogène, sont parfois concentrés dans des zones limitées, provoquant ainsi une dépression importante dans la nappe et le pompage des eaux saumâtres. Les eaux de la nappe ont des fortes concentrations en sels minéraux, notamment en chlorures (800 mg/l), dépassant largement les normes de l'OMS (200 mg/l).

La zone littorale sud sous laquelle la nappe de Djibouti se situe, est une région où on a d'importantes activités économiques. En dehors des populations locales des villages de Damerjog et de Douda, les échanges commerciaux avec la Somalie transitent par les axes de circulation fréquentés par des camions transportant des produits divers dont des hydrocarbures. La zone du projet abrite également plusieurs champs de tirs militaires et un centre régional de mise en quarantaine et d'exportation du bétail vers les pays du Golfe.

La zone du projet se situe dans une région proche de la Somalie qui connaît depuis le début des années 90 une instabilité politique.

#### ANALYSE ET JUSTIFICATION AU REGARD DES LIENS AVEC LES CHANGEMENTS CLIMATIQUES ET SECTEURS CONCERNES

La surexploitation de la nappe de Djibouti pour la consommation humaine conjuguée aux prélèvements des périmètres irrigués situés en zone littorale ont entraîné une salinisation accrue des eaux de la nappe. Les baisses de précipitations attendues selon les scénarios prévus dans les changements climatiques, auront pour conséquences une baisse de la recharge et une augmentation croissante du phénomène de salinisation. Par ailleurs, les ouvrages d'alimentation en eau de la ville de Djibouti (forages et conduites) installés dans la zone du projet sont menacés par les conséquences dues à l'élévation du niveau de la mer

La situation sans projet entraînerait une salinisation de plus en plus importante des eaux distribuées dans la ville de Djibouti dont les concentrations en sel minéraux dépassent déjà actuellement les normes de l’OMS.

Les eaux souterraines sont pour la plupart mal connues, surexploitées notamment de Djibouti. A part quelques sources permanentes dans les régions montagneuses et que la sécheresse sévère des cinq dernières années a épuisé, il n'existe pas de cours d'eau pérennes sur le territoire national djiboutien. Le réseau hydrographique se subdivise en deux: les oueds qui Jettent leurs eaux dans les dépressions de l'intérieur (écoulement endoréique) et ceux qui déversent dans la mer (écoulement exoréique).

Le ruissellement qui ne représente qu'à peine 6% des précipitations est caractérisé par une forte puissance à cause de l'état de surface du sol et surtout des pentes importantes.

Les visites de terrain montrent bien que les ressources en eau de surface sont encore sous exploitées et que le choix du plan d'action d'hydraulique rurale de se replier sur cette ressource pour soulager la pression sur les nappes d'eau souterraine est un choix judicieux, stratégique et offre des solutions adaptées au milieu rural.

Une stratégie amont-aval s'impose en commençant avec des petits ouvrages pour une maîtrise progressive des cours d'eau. L'échec de l'expérience des retenues collinaires importantes.

Il n'existe à l'heure actuelle aucune étude de l'intensité et de l'étendue de l'érosion des sols à l'échelle nationale à part celles de deux petits bassins versants du Massif du Day. L'analyse du réseau hydrographique' et la prospection géomorphologique du terrain par la mission dans les cinq districts visités indiquent que le milieu n'est plus en équilibre avec les conditions actuelles arides mais très agressives. A l'érosion géologique, dite naturelle, qui a façonné le relief actuel très accidenté c'est greffé progressivement une érosion accélérée d'origine anthropique.

Il existe différents types d'érosion: par rigole, le ravinement profond, l'érosion fluviale par sapement des berges.

#### DESCRIPTION

##### Objectifs

- Réduction de la salinisation des eaux de la nappe d Djibouti;
- Protection des ouvrages d production d'eau;
- Sécurisation de l'alimentation en eau de la ville de Djibouti.

##### Activités

- Arrêt des forages les eaux sont les plus salées et réalisation d'autres forages dans les secteurs favorables;
- Finalisation de la modélisation de la nappe;
- Protection des côtes contres l'élévation du niveau de mer;
- Information, sensibilisation des communautés locales à la protection des ouvrages de production d'eau.

##### Intrants

- Le projet requiert des ressources additionnelles humaines, financières et physiques qui seront détaillées dans la proposition de projet finale.

### Résultats à court terme

- Protection des ouvrages de production d'eau assurée;
- Meilleure répartition des points de captage réalisée;
- Salinisation des eaux atténuée;
- Protection des côtes du littoral assurée.

### Résultats à long terme

- Outil de planification et de gestion de la nappe disponible grâce à la modélisation de la nappe;
- Alimentation en eau de la capitale sécurisée.

### MISE EN OEUVRE

### Arrangements institutionnels

- Le projet sera piloté par un comité présidé par le Ministère de l'Environnement et comprenant les départements techniques concernés.
- Au niveau régional il y aura un Comité de gestion composé du Commissaire de la République et des représentants du Conseil Régional, d'ONG et des Communautés locales. L'exécution sur le terrain sera assurée par des opérateurs privés.

### Risques et obstacles

Les risques sont limités et peuvent provenir de la lenteur d'exécution des différentes phases du projet.

### Evaluation et suivi

Le comité de pilotage mettra en place un sous-comité technique de suivi et d'évaluation du projet s'assurera que les résultats escomptés et les délais de mise en oeuvre soient respectés. Il fournira régulièrement des rapports détaillés au comité de pilotage.

### Ressources financières

#### PLAN DE FINANCEMENT

- **Total: 0.82 M USD**
  - **Ligne de base 0**
  - **GEF: 0.82 M USD**
- (1USD = 170 FD)

Arrêt des forages les eaux sont les plus salées et réalisation d'autres forages dans les secteurs favorables.	60 000 000 Mfd
Finalisation de la modélisation de la nappe	40 000 000 Mfd
Protection des côtes contre l'élévation du niveau de mer	30 000 000 Mfd
Information, sensibilisation des communautés locales à la protection des ouvrages de production d'eau	10 000 000 Mfd
<b>Total</b>	<b>140 000 000 Mfd</b> <b>0.82 M USD</b>



# ETHIOPIA

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## NAPA PRIORITY PROJECT 9

### ESTABLISHMENT OF NATIONAL CLIMATE RESEARCH CENTER

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#### RATIONALE/JUSTIFICATION

Climate is a key natural resource on which the others depend. It influences food production, water and energy availability. It sets the stage for the establishment of habitats, affects the pace of primary productivity, and influences species density and distribution. At the moment there is no dedicated institution which carries out research and studies on the issues of climate change and variability in the country.

#### DESCRIPTION

##### **Objectives**

To establish a national climate center which can provide information and policy advice for government through research and studies.

##### **Activities**

- Assessment of needs and current situation;
- Undertake consultation with stakeholders;
- Acquisition of facilities;
- Short and long term training of personnel on climate change issues;
- Preparation of full project proposal.

##### **Short-term outputs**

- Establishment of well equipped centre for climate change research centre;
- Trained human capital that can undertake research and studies on climate change.

##### **Potential long-term outcomes**

The Centre will help the country to pursue sustainable development that contributes for the protection of the earth's climate. The establishment of the center will also enhance the adaptive capacity of the country for climate related risks.

#### IMPLEMENTATION

##### **Institutional arrangement**

National Meteorological Agency will lead the coordination of the project.

##### **Risks and barriers**

Lack of finance, lack of technical capacity, legal/institutional

##### **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 3 million*

*Project design: USD 200,000*

# GUINÉE

## NAPA PRIORITY PROJECT 16

### OPTION VII: PROMOTION DE L'AMENAGEMENT ET DE LA GESTION INTEGREE DES PETITS OUVRAGES HYDRAULIQUES PROJET 7-1: RÉALISATION DE MICRO-BARRAGES À BUTS MULTIPLES

Les impacts de la variabilité et du changement climatiques se traduisent déjà par le tarissement prononcé de beaucoup de cours d'eau, même la disparition des plus exposés. Cette situation entraîne une très forte pression sur les ressources hypothétiques en eau, mettant ainsi en péril la survie des écosystèmes naturels. Le stress hydrique qui en découlera aura pour conséquence l'augmentation de la mortalité des espèces végétales et animales particulièrement en Haute et Moyenne Guinée.

**Localisation:** Siguiri, Gaoual, Lélouma et Dinguiraye

**Secteur:** Ressources en Eau.

#### JUSTIFICATION

Avec la forte croissance démographique et l'exacerbation de la sécheresse (identifiée en Guinée comme le risque majeur dans toutes les régions naturelles particulièrement en Haute et Moyenne Guinée), les ressources en eau vont s'amenuiser rendant difficiles les prélèvements d'eau pour les divers usages. La mise en oeuvre d'activités de conservation et de restauration des ressources en eau disponibles sera opportune dans le cadre de l'adaptation des populations de ces régions aux changements climatiques. C'est dans cette perspective que la réalisation de micro barrages à buts multiples dans ces préfectures, identifiées comme les plus exposées aux impacts des risques climatiques est envisagée en vue de palier au déficit hydrique. En outre, la mise en oeuvre de ce projet permettra la reconstitution des écosystèmes montagneux par la fixation des activités agricoles dans les plaines et bas-fonds aménagés.

#### DESCRIPTION

##### Objectifs

##### **Général**

Maîtriser l'eau pour les différents usages en vue de l'adaptation aux impacts avérés des changements climatiques.

##### **Spécifiques**

Réaliser des micro-barrages pour l'irrigation des plaines et bas-fonds - Créer des points pastoraux, - Créer des prises d'eau pour les besoins domestiques.

##### Activités

- Information et sensibilisation des populations bénéficiaires;
- Identification des sites de barrages;
- Réalisation des études et des ouvrages;
- Formation des bénéficiaires à la gestion des ouvrages;
- Suivi-évaluation.

##### Résultats attendus

- Populations cibles formées et sensibilisées;
- 4 micro-barrages réalisés;

- Défrichements sur coteaux réduits;
- Adaptation aux changements climatiques assurée.

**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**

Conditions climatiques extrêmes, conflits domaniaux.

**Indicateurs de suivi**

- Pourcentage de la population sensibilisée et formée;
- Nombres de micro barrages réalisés;
- Rapports (technique, PV de réunions, missions suivi-évaluation).

**Durée**

2 ans

**COÛT**

<i>USD 600,000</i>
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# GUINÉE

## NAPA PRIORITY PROJECT 17

### OPTION VII: PROMOTION DE L'AMENAGEMENT ET DE LA GESTION INTEGREE DES PETITS OUVRAGES HYDRAULIQUES PROJET 7-2: RÉALISATION DE RETENUES COLLINAIRES

**Localisation:** Dinguiraye, Tougué, Gaoual.

**Secteur:** Ressources en Eau

#### JUSTIFICATION

Les études sur les cibles les plus vulnérables aux changements climatiques, indiquent clairement la forte variabilité des régimes pluviométriques et hydrologiques, caractérisée par une succession d'années déficitaires depuis les années 70. Suite aux effets des changements climatiques, cette situation s'amplifiera et engendrera une dégradation accrue des ressources en eau. Les régions de la Haute et Moyenne Guinée, identifiées comme les plus touchées par le phénomène, ont un relief favorable à la réalisation de retenues collinaires permettant aux populations des zones concernées de disposer d'eau pour les différents usages en saison sèche (agricole, pastorale et domestique).

#### DESCRIPTION

##### Objectifs

##### **Global**

Maîtriser l'eau pour les différents usages en vue de l'adaptation aux impacts avérés des changements climatiques. **Spécifiques**

- Réaliser des retenues collinaires pour l'irrigation des plaines et bas-fonds;
- Créer des points pastoraux;
- Créer des prises d'eau pour les besoins domestiques.

##### Activités

- Information et sensibilisation des populations bénéficiaires;
- Identification des sites favorables de retenues;
- Réalisation des études et des ouvrages;
- Formation des bénéficiaires à la gestion des ouvrages;
- Suivi-évaluation.

##### Résultats attendus

- Populations cibles informées et sensibilisées;
- 12 Sites identifiés;
- 12 retenues collinaires réalisés;
- Bénéficiaires formés à la gestion des ouvrages;
- Adaptation aux changements climatiques assurée.

#### 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

spécialisées. La coordination sera assurée par l'unité PANA au sein du Conseil National de l'Environnement (CNE).

**Agence d'exécution**

PNUD

**Risques**

Conditions climatiques extrêmes, Conflits domaniaux.

**Indicateurs de suivi**

- Pourcentage de la population informée et sensibilisée;
- Nombres de retenues collinaires réalisées;
- Rapports (techniques, PV de réunions, missions suivi-évaluation).

**Durée**

2 ans

**COÛT**

*USD 180,000*

# GUINÉE

## NAPA PRIORITY PROJECT 18

### OPTION VII: PROMOTION DE L'AMENAGEMENT ET DE LA GESTION INTEGREE DES PETITS OUVRAGES HYDRAULIQUES PROJET 7-3: REALISATION DE PUIITS AMELIORES

**Localisation:** Mali, Koubia, Mandiana, Sigouri, Koundara

**Secteur:** Ressources en Eau

#### JUSTIFICATION

Les études de vulnérabilité et d'adaptation aux changements climatiques réalisées en Guinée indiquent que la tendance à la baisse des précipitations et à l'augmentation de la température observée à partir de 1961 jusqu'à nos jours accompagnée d'autres facteurs comme la croissance démographique rendent très vulnérables les différentes ressources en eau. Certaines zones de la Guinée sont aussi caractérisées par une forte pénurie d'eau en raison du manque d'eau de surface. Pour permettre aux populations de ces zones d'accéder à l'eau potable, il est nécessaire de faire recourt aux eaux souterraines par fonçage de puits améliorés comme solution alternative.

#### DESCRIPTION

##### Objectifs

##### **Global**

Promouvoir l'utilisation des eaux souterraines pour couvrir les besoins en eau potable.

##### **Spécifiques**

Réaliser des puits améliorés pour les besoins en eau potable;

Créer des points d'eau pastoraux.

##### Activités

- Information et sensibilisation des populations bénéficiaires;
- Identification des sites;
- Réalisation des puits;
- Suivi-évaluation.

##### Résultats attendus

- Populations cibles informées et sensibilisées;
- Sites identifiés;
- 100 puits améliorés réalisés;
- Bénéficiaires formés à la gestion des puits.

#### 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 d'exécution

PNUD

**Risques**

Conditions climatiques extrêmes

**Indicateurs de suivi**

Pourcentage de la population informée et sensibilisée;

Nombre de puits réalisés;

Nombre de personnes formées;

Rapports (techniques, PV de réunions, missions suivi-évaluation).

**Durée**

1 an

**COÛT**

*USD 250,000*



# GUINÉE

## NAPA PRIORITY PROJECT 19

### OPTION VII: PROMOTION DE L'AMENAGEMENT ET DE LA GESTION INTEGREE DES PETITS OUVRAGES HYDRAULIQUES PROJET 7-4: POTABILISATION DES EAUX DE SURFACE PAR HYDROPUR

**Localisation:** Mandiana, Tougué, Boké, Beyla.

**Secteur:** 1Ressources en Eau

#### JUSTIFICATION

Les études de vulnérabilité et d'adaptation aux changements climatiques réalisées en Guinée indiquent que la tendance à la baisse des précipitations et à l'augmentation de la température observées à partir de 1961 jusqu'à nos jours accompagnée d'autres facteurs comme la croissance démographique rendent très vulnérables les différentes ressources aux changements climatiques. Malgré les importantes quantités d'eaux de pluie précipitée sur le territoire national et les innombrables cours d'eau, de nombreux villages éprouvent d'énormes difficultés d'approvisionnement en eau potable. Les cours d'eau, l'eau de pluie, les mares renferment des particules en suspension et une charge microbienne élevées rendant leur eau impropre à la consommation humaine. Pour résoudre cette pénurie d'approvisionnement en eau potable, l'introduction de la potabilisation des eaux de surfaces par le système hydropur est envisagée comme technologie alternative.

#### DESCRIPTION

##### Objectifs

##### **Global**

Amélioration des conditions d'accès à l'eau potable

##### **Spécifiques**

Réaliser de stations «hydropur» pour l'approvisionnement en eau potable;

Réduire la prolifération des maladies hydriques.

##### Activités

- Information et sensibilisation des populations bénéficiaires;
- Identification des sites;
- Réalisation des ouvrages;
- Suivi-évaluation.

##### Résultats attendus

- Populations cibles informées et sensibilisées;
- Sites identifiés;
- 4 stations d'hydropurs réalisées;
- Bénéficiaires formés à la gestion des ouvrages.

#### 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

spécialisées. La coordination sera assurée par l'unité PANA au sein du Conseil National de l'Environnement (CNE).

**Agence d'exécution**

PNUD

**Risques**

Conditions climatiques extrêmes

**Indicateurs de suivi**

- Pourcentage de la population informée et sensibilisée.
- Nombre de stations réalisées;
- Nombre de personnes formées;
- Rapports (techniques, PV de réunions, missions suivi-évaluation).

**Durée**

2 ans

**COÛT**

*USD 320,000*

# GUINÉE

## NAPA PRIORITY PROJECT 20

### OPTION VII: PROMOTION DE L'AMENAGEMENT ET DE LA GESTION INTEGREE DES PETITS OUVRAGES HYDRAULIQUES PROJET 7-5: VULGARISATION DES IMPLUVIUMS

**Localisation:** Lélouma, Labé, Mali, Tougué, Dinguiraye, Koundara et Mandiana  
**Secteur:** Ressources en Eau

#### JUSTIFICATION

Les études de vulnérabilité et d'adaptation aux changements climatiques réalisées en Guinée indiquent que la tendance à la baisse des précipitations et à l'augmentation de la température observée à partir de 1961 jusqu'à nos jours accompagnée d'autres facteurs comme la croissance démographique rendent très vulnérables les ressources en eau aux changements climatiques. Les lieux ciblés par le projet, situés dans le nord sont les plus touchés par la sécheresse, la pauvreté extrême et une forte pénurie d'eau. Pour remédier à cette situation, il est envisagé de recueillir les eaux de pluies par des impluviums afin de satisfaire aux besoins en eau des populations de nombreux villages. La vulgarisation de cette technologie au niveau des zones les plus touchées permettra de palier au déficit hydrique à moindre coût et assurera l'adaptation des populations au changement climatique.

#### DESCRIPTION

##### Objectifs

##### **Global**

Satisfaire les besoins en eau potable des populations en zones enclavées

##### **Spécifiques**

- Satisfaire les besoins domestiques en eau potable;
- Satisfaire les besoins pastoraux; - réduire la prolifération des maladies hydriques.

##### Activités

- Information et sensibilisation des populations bénéficiaires;
- Identification des sites;
- Réalisation des études et des ouvrages;
- Formation des bénéficiaires à la réalisation et à la gestion des ouvrages;
- Suivi-évaluation.

##### Résultats attendus

- Populations informées et sensibilisées;
- Impluviums sont construits;
- Fourniture d'eau assurée;
- Transfert des technologies assuré;
- Maladies d'origine hydrique réduites.

**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).

**Risques**

Risques climatiques extrêmes

**Indicateurs de suivi**

Populations sensibilisées et formées. - Nombre d'impluviums réalisés; - Effectifs des populations touchées par le projet; - Rapports (technique, financier, PV de réunion, missions).

**Durée**

1an

**COÛT**

*USD 280,000*

# MADAGASCAR

## NAPA PRIORITY PROJECT 001

### RÉHABILITATION ET/OU CONSTRUCTION DES BARRAGES ET DIGUES DE PROTECTION

#### DESCRIPTION

L'eau tient une place importante dans la vie de la population et leurs activités de production. Actuellement, la population rencontre divers problèmes liés au non maîtrise de l'eau. C'est pour cette raison que la gestion durable des ressources en eau occupe la deuxième place dans les projets d'adaptation aux changements climatiques.

#### **Objectif**

L'objectif de ce projet est la mise en place des infrastructures telles que les barrages et digues de protection qui permettent à la population d'accéder à l'eau de l'irrigation pour la production.

#### **Activités**

1. Construction des barrages
2. Construction des digues de protection
3. Gestion durable des ressources en eau (irrigation, pluie artificielle, Traitement des eaux, IEC Information Education Communication sur la préservation des sources)

#### **Intrants**

Ressources financières pour la réalisation des ouvrages dans des régions ciblées. Des formateurs communicateurs; des ingénieurs agronomes et hydrauliques.

#### **Résultats attendus à court terme**

- Zone cible identifiée;
- Population desservie et consciente de l'importance de la préservation des ressources en eau;
- Techniques améliorées sur la protection des sources et la préservation de l'eau.

#### **Résultats potentiels à long terme**

- Disponibilité en eau tout au long du cycle de production dans toutes les régions;
- Les associations des bénéficiaires maîtrise la gestion durable des ressources en eau;
- Hausse du rendement de la production.

#### MISE EN OEUVRE

#### **Arrangements institutionnels**

MAEP, MINENVEF, ANDEA, ONG, Autorités régionales et les maîtres d'oeuvre délégué, Bénéficiaires du projet

#### **Risques et obstacles**

- Coût élevé de la mise en place des infrastructures;

- Capacité d'assimilation de la population cible sur la gestion durable des ressources en eau.

**EVALUATION, SUIVI ET RESSOURCES FINANCIÈRES**

*Total: USD 250 000*

Indicateur objectivement vérifiable (IOV)	Montant (USD)		
	ANNEE 1	ANNEE 2	ANNEE 3
Nombre de barrage construit. Nombre de digue de protection construite.	125 000	125 000	0
<b>TOTAL</b>	<b>250 000</b>		

# MADAGASCAR

## NAPA PRIORITY PROJECT 006

### MISE EN PLACE DES INFRASTRUCTURES TELS QUE LES DIGUES, LES ÉPIS POUR PRÉVENIR LA MONTÉE DE NIVEAU DE LA MER

#### DESCRIPTION

En matière d'érosion côtière, le cas de la ville de Morondava et certaines parties du Moyen-Ouest du littoral malgache sont les plus connus depuis plusieurs décennies. Récemment, un cas a été signalé à Mahajanga. La côte Est malgache connaît aussi le même phénomène car une partie de l'avenue bordant la plage de la ville de Toamasina est détruite, à Manakara un boulevard de la ville se trouve également menacé. Donc la mise en place des infrastructures tels que les digues, les épis pour maîtriser l'érosion causée par la montée de niveau de la mer est importante

#### **Objectif**

Gestion durable du milieu marin et la côte de Madagascar

#### **Activités**

Mise en place des infrastructures tels que les digues, les épis

#### **Intrants**

Moyens financiers pour la construction, les matériels requis, les entrepreneurs Maître d'oeuvre du chantier

#### **Résultats attendus à court terme**

- Cotes réparées;
- Protection du milieu par l'application de la stratégie nationale, régionale et locale pour la préservation de la zone côtière.

#### **Résultats potentiels à long terme**

Gestion rationnelle du milieu marin et côtier par les communautés locales

#### MISE EN OEUVRE

#### **Arrangements institutionnels**

Ministère de l'environnement des eaux et forêts; Ministère du TP Autorités régionales et locales, Population bénéficiaire du projet

#### **Risques et obstacles**

- Faiblesse des moyens financiers;
- Efficacité des techniques utilisées pour la construction de cet ouvrage.

#### EVALUATION, SUIVI ET RESSOURCES FINANCIÈRES

*Total: USD 150 000*

Indicateur objectivement vérifiable (IOV)	Montant (USD)		
	ANNEE 1	ANNEE 2	ANNEE 2

Nombre des digues ou des épis construits	75 000	75 000	0
<b>TOTAL</b>	<b>150 000</b>		



# MADAGASCAR

## NAPA PRIORITY PROJECT 010

### DÉSENCLAVEMENT DES ZONES DE PRODUCTION POTENTIELLE, PAR LA RÉHABILITATION DES RÉSEAUX DE COMMUNICATION ET DE TÉLÉCOMMUNICATION POUR FAVORISER LES ÉCHANGES ET LA COMMERCIALISATION

#### DESCRIPTION

Le développement et l'intensification de la communication permet de prévenir suffisamment la population des prévisions météorologiques. Elle pourrait en conséquence adapter entre autres leur calendrier de production. La mise en place des infrastructures permet en outre de développer les échanges et la commercialisation, la sensibilisation et l'éducation de la population.

Le projet consiste à mettre en place ou réhabiliter les infrastructures du réseau de communication et de télécommunication.

#### **Objectif**

Une meilleure communication des prévisions météorologiques afin que la population puisse adapter leur calendrier cultural, favoriser les échanges et la commercialisation.

#### **Activités**

Désenclavement des zones de production potentielle, par la réhabilitation des réseaux de communication (Route, pont,...) et de télécommunication pour favoriser les échanges et la commercialisation.

#### **Intrants**

Matériels de communication et de télécommunication, moyens financiers pour la mise en place du réseau, des supports d'information.

#### **Résultats attendus à court terme**

- Population bien informée des prévisions météorologiques;
- La majorité de la population dotée des supports de communication;
- Réseau de communication et de télécommunication mise en place.

#### **Résultats potentiels à long terme**

- Toute la population dotée des supports de communication (radio, télévision);
- Accessibilité pendant toute l'année des voies de communication.

#### MISE EN OEUVRE

#### **Arrangements institutionnels**

Direction de la Météorologie, Autorité Régionale et locale, Chaîne de télévision et radio privée, population bénéficiaire du projet.

#### **Risques et obstacles**

Faiblesse des moyens financiers pour l'acquisition des matériels

EVALUATION, SUIVI ET RESSOURCES FINANCIÈRES

*Total: USD 1,999,980*

Indicateur objectivement vérifiable (IOV)	Montant (USD)		
	ANNEE 1	ANNEE 2	ANNEE 2
Nombre de Commune accessible toute l'année	666 660	666 660	666 660
<b>TOTAL</b>	<b>1 999 980</b>		

# MADAGASCAR

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## NAPA PRIORITY PROJECT 011

### DE L'IEC PAR DES SUPPORTS APPROPRIÉS (OPÉRATION RADIO; SYSTÈME D'INFORMATION)

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#### DESCRIPTION

Un faible pourcentage de la population rurale possède des supports d'information tels que les postes radio, les télévisions. L'information, l'éducation, la communication à ces catégories de population connaissent de difficultés en particulier les informations relatives à la prévision météorologique.

La campagne de vulgarisation de ces supports de communication permet de développer la sensibilisation et l'éducation de la population.

Le projet consiste à mettre en oeuvre une opération radio et la réhabilitation des infrastructures du réseau de communication et de télécommunication existant.

#### **Objectif**

Augmentation de niveau de connaissance des populations dans le monde rural par le développement de l'IEC

#### **Activités**

1. Mise en place des infrastructures nécessaires au développement de l'IEC
2. Formation des agents sur place

#### **Intrants**

Matériels de communication et de télécommunication, moyens financiers pour la mise en place du réseau, des supports d'information et la formation des agents sur place

#### **Résultats attendus à court terme**

- Réseau de communication et de télécommunication mise en place;
- Population bien informée des techniques nouvelles et apte à le pratiquer;
- La majorité de la population dotée des supports de communication.

#### **Résultats potentiels à long terme**

- Toute la population dotée des supports de communication (radio, télévision);
- Transfert des informations dans le temps.

#### MISE EN OEUVRE

#### **Arrangements institutionnels**

Ministère de Communication, Autorité Régionale et locale, Chaîne de télévision et radio privée

#### **Risques et obstacles**

- Faiblesse des moyens financiers pour l'acquisition des matériels;
- Capacité d'assimilation de la population.

**EVALUATION, SUIVI ET RESSOURCES FINANCIÈRES**

*Total: USD 270 000*

Indicateur objectivement vérifiable (IOV)	Montant (USD)		
	ANNEE 1	ANNEE 2	ANNEE 2
Fréquence de l'intervention et taux de participation	90 000	90 000	90 000
<b>TOTAL</b>	<b>270 000</b>		

# MADAGASCAR

## NAPA PRIORITY PROJECT 015

### ELABORATION, COMMUNICATION ET APPLICATION DES NORMES EN MATIÈRE DE CONCEPTION ET DE CONSTRUCTION COUVRANT L'ENSEMBLE DES INFRASTRUCTURES POUR S'ASSURER QU'ELLES PEUVENT RÉSISTER À DES ÉVÈNEMENTS CLIMATIQUES EXTRÊMES

#### DESCRIPTION

La reconstruction des infrastructures ravagées après le passage des cyclones reste encore l'une des problèmes du pays en voie de développement comme Madagascar. Pour faire face à ce problème la normalisation de la construction par rapport aux changements et risques climatiques et la modernisation des infrastructures sont nécessaires

#### Objectif

- Toutes les infrastructures sont construites suivant des normes renforcées en prévision des risques climatiques;
- Des silos et des greniers communautaires villageoises sont disponibles.

#### Activités

Elaboration, communication et application des normes en matière de conception et de construction couvrant l'ensemble des infrastructures pour s'assurer qu'elles peuvent résister à d'importants bouleversements météorologiques.

#### Intrants

Ingénieur en Bâtiments et Travaux publics; spécialiste en micro hydraulique; Moyens financiers pour la mise à disposition de certains ouvrages.

#### Résultats attendus à court terme

- Normes en matière de conception et de construction disponible et appliqué par des entrepreneurs;
- Résultats potentiels à long terme;
- Toutes les infrastructures résistent aux risques climatiques.

#### MISE EN OEUVRE

#### Arrangements institutionnels

Ministère de TP; MAEP; MINENVEF; Autorités régionales et les maîtres d'oeuvre délégué; Population ou région bénéficiaire de ce projet

#### Risques et obstacles

- Coût élevé de la construction;
- Disponibilité des matériaux nécessaires.

#### EVALUATION, SUIVI ET RESSOURCES FINANCIÈRES

*Total: USD 60 000*

Indicateur objectivement vérifiable (IOV)	Montant (USD)		
	ANNEE 1	ANNEE 2	ANNEE 2
Norme disponible Nombre des entreprises pratiquantes la norme	60 000	0	0
<b>TOTAL</b>			<b>60 000</b>

# MALDIVES

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## NAPA PRIORITY PROJECT 4

### COASTAL PROTECTION OF MALE' INTERNATIONAL AIRPORT TO REDUCE THE RISK FROM SEA INDUCED FLOODING AND PREDICTED SEA LEVEL RISE

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#### RATIONALE

Fresh water is one of most scarce resources in the Maldives. To the Maldivian community, the effect of climate change on water resources would mean changes to freshwater availability. The December 2004 tsunami had aggravated the limited freshwater availability of the islands. In addition to flooding causing salinization of the groundwater, a high percentage of rainwater storage tanks and/or catchment areas were damaged on the tsunami impacted islands. This event itself demonstrates the vulnerability of the water resources of Maldives to future impacts of climate change. Increasing the capacity for rainwater harvesting and storage in the island communities has been identified as an important adaptation options by the NAPA process. This project is also intended to ensure that rainwater storage facilities are designed to be protected from impacts of flooding and high wave incidents. As seawater is an abundant resource in the Maldives, the use of desalination technologies to provide emergency freshwater has also been recognized as a needed adaptation measure. This project contains two components which looks into the above mentioned adaptation options. The location of the project will be an island selected for development as a Safer Island under the national development planning.

#### DESCRIPTION

##### Goal

To increase adaptive capacity to manage climate change related risks to fresh water availability

##### Objectives

1. Increase rainwater harvesting capacity and storage;
2. Acquire technology for emergency freshwater provision.

##### Activities

1. Establish rainwater harvesting and storage facilities on all public buildings;
2. Develop community awareness on safe rainwater harvesting and storage practices;
3. Establish emergency backup desalination system.

##### Short-term outputs

- Community rainwater collection and storage established;
- Information on safe rainwater collecting and storage practices developed and disseminated to community;
- Emergency water secured.

##### Potential long-term outputs

- Increased security of fresh water availability;

- Improved health and well-being of community due to access to safer drinking water;
- Increased resilience to water shortages in case of disaster, emergency and predicted impacts of climate change.

#### IMPLEMENTATION

##### **Institutional arrangements**

###### **Lead agency**

Ministry of Environment, Energy and Water

###### **Project Partners**

Ministry of Atolls Development; Ministry of Planning and National Development; Ministry of Construction and Public Infrastructure; Ministry of Housing and Urban Development; Atoll Offices; Island Offices; NGOs and community level organisations.

###### **Risks and Barriers**

Lack of human and financial resources.

###### **Evaluation and monitoring**

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

#### FINANCIAL RESOURCES

*The total project cost is USD 900,000*

An activities based budget for the project is given below.

<b>Activity</b>	<b>Cost (USD)</b>
1. Establish rainwater harvesting and storage facilities on public buildings	430 000
2. Develop community awareness on safe rainwater harvesting and storage practices	30 000
3. Establish emergency backup desalination system	440 000
<b>Total</b>	<b>900 000</b>



# MALDIVES

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## NAPA PRIORITY PROJECT 8

### IMPROVE RESILIENCE OF ISLAND COMMUNITIES TO CLIMATE CHANGE AND VARIABILITY THROUGH SUSTAINABLE BUILDING DESIGNS

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#### RATIONALE

The low elevation and small size of Islands of the Maldives, makes the population highly vulnerable to the predicted rise in sea level and frequent and more intense extreme weather events. Over the last 6 years more than 90 inhabited islands have been flooded at least once and 37 islands have been flooded regularly or at least once a year. The average width of inhabited islands is 566m resulting in most settlements to be within close proximity from the coastline. There is little opportunity for communities to retreat inland. It has been found that 44% of the settlement footprints of all islands are within 100m of coastline which translates to 47% of all housing structures and 42% of the population being within 100m of coastline. Majority of the islands, have more than 50% of their housing structures within 100m of coastline.

There is currently low adaptive capacity due to insufficient knowledge, limited human resources in institutions and poor regulatory framework. The current building code does not take climate change associated impacts into account and the linkage is poorly understood due to inadequate information dissemination. This project proposes to review and improve existing building designs and methods to enable resilience to climate change impacts. This project would create an enabling environment for replication of similar projects. This project would also complement the tsunami reconstruction efforts of the Housing and Infrastructure Reconstruction Unit (HIRU) of the Ministry of Planning and National Development.

#### DESCRIPTION

##### **Goal**

Develop better and stronger buildings to increase resilience of island communities to climate change and variability.

##### **Objectives**

1. Develop and demonstrate climate change resilient building structures;
2. Develop building methodology to enable replication of more resilient building design.

##### **Activities**

1. Review existing designs and methods used for building design and compile methodology and guidelines for constructing more resilient buildings;
2. Construct demonstration structures on location identified by HIRU;
3. Based on experience of the demonstration project, translate and publish in local language and metric conversions, the building methodology and guidelines for replication purposes;
4. Develop and disseminate public awareness materials on development of more resilient building structures.

### Short-term outputs

- Climate change concerns addressed in the design of building structures;
- Methodology for construction of climate change resilient buildings developed;
- Climate change resilient building structures implemented;
- Materials developed for replication of similar projects;
- Community awareness materials developed.

### Potential long-term outputs

- Increased resilience of buildings to predicted rise in sea level and frequent and more intense extreme weather events;
- Improved protection of island communities.

## IMPLEMENTATION

### Institutional arrangements

The project will be implemented by the identified lead agency. The implementation of all the proposed NAPA projects will be overseen by the NAPA Steering Committee.

### Lead agency

Ministry of Construction and Public Infrastructure

### Project Partners

Ministry of Planning and National Development; Ministry of Housing and Urban Development; Ministry of Atolls Development; Ministry of Environment, Energy and Water; National Disaster Management Centre.

### Risks and Barriers

Potential high costs of developing climate change resilient structures.

### Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

## FINANCIAL RESOURCES

*The total project cost is USD 1,970,000*

An activities based budget for the project is given below.

Activity	Cost (USD)
Review existing designs and methods used for building design and compile methodology and guidelines for constructing more resilient buildings	50 000
Construct demonstration structures	1 865 000
Translate and publish the building methodology and guidelines for replication purposes	25 000
Develop and disseminate public awareness materials on development of more resilient building structures	30 000
<b>Total</b>	<b>1 970 000</b>

# MALDIVES

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## NAPA PRIORITY PROJECT 10

### IMPROVE THE DESIGN AND CONSTRUCTION OF ACCESS INFRASTRUCTURE IN MALDIVES TO INCREASE THE RESILIENCE OF ACCESS INFRASTRUCTURE AND ISLAND BEACHES TO CLIMATE CHANGE

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#### RATIONALE

The importance of sea transport in the socio-economic development of Maldives has meant that appropriate and functioning access infrastructure is a basic necessity in all inhabited islands. Unfortunately, such infrastructure is also highly vulnerable to severe weather events and predicted climate change risks. The unconsolidated nature of coral islands and low elevation means that the predicted sea level rise and increase in intensity and frequency of storm activity in the Indian Ocean could potentially expose access infrastructure to considerable risks. These climatic root causes and their potential magnitude of damage are exacerbated due to improper design and construction. High demand for access infrastructure combined with massive capital costs associated with construction, has inadvertently led the Government to adopt short-term solutions by constructing low cost harbours. Maldives being one of the least developed countries could not in the past afford the high costs of climate resilient structures. As a result, majority of the access infrastructure were poorly designed and constructed, and are not expected to withstand future climate change, let alone present severe climatic events. During the tsunami of 2004, 68% of all existing harbours were damaged, some beyond use. This project proposes to review existing studies and designs of access infrastructure and design infrastructure that is more resilient to climate change impacts.

#### DESCRIPTION

##### **Goal**

Improve the resilience of access infrastructure and island beaches to severe weather events and predicted climate change.

##### **Objective**

Develop and demonstrate climate change resilient, environment friendly and cost-effective engineering solutions for access infrastructure.

##### **Activities**

1. Review existing studies and designs of access infrastructure engineering, taking into consideration the current climate change scenarios;
2. Develop designs more resilient to climate change impacts and undertake a cost-effectiveness analysis of suitable designs;
3. Demonstrate and test the effectiveness of improved design by constructing a model harbour in a selected Safer Island.

##### **Short-term outputs**

- Climate change impacts incorporated in design of access infrastructure;
- More resilient and cost-effective access infrastructure designed;
- Climate change resilient access infrastructure implemented.

##### **Potential long-term outputs**

Cost effective climate change resilient and environment friendly access infrastructure designs developed and mechanisms to replicate new designs nationwide established.

## IMPLEMENTATION

### Institutional arrangements

#### Lead agency

Ministry of Construction and Public Infrastructure

#### Project Partners

Ministry of Planning and National Development; Ministry of Housing and Urban Development; Ministry of Atolls Development; Ministry of Environment, Energy and Water; National Disaster Management Centre.

#### Risks and Barriers

- Potential high costs of developing climate change resilient structures today;
- Long-term studies required to assess potential effective designs may be beyond the project timeframe.

#### Evaluation and monitoring

The project will be monitored according to the national M&E standards set by President's Office and MPND. Quarterly progress reports, expenditure reports, annual monitoring reports will be submitted to MPND. In addition, any donor finance agency requirements on M&E will be fulfilled.

## FINANCIAL RESOURCES

*The total project cost is USD 3,800,000*

Activities based budget is shown on left.

Activity	Cost (USD)
Review existing studies and designs of access infrastructure engineering, taking into consideration the current climate change scenarios.	100 000
Develop designs more resilient to climate change impacts and undertake a cost-effectiveness analysis of suitable designs.	100 000
Demonstrate and test the effectiveness of improved design by constructing a model harbour in a selected Safer Island.	3 600 000
<b>Total</b>	<b>3 800 000</b>

# SAMOA

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## NAPA PRIORITY PROJECT 7

### PROJECT PROFILE 7: IMPLEMENT COASTAL INFRASTRUCTURE MANAGEMENT PLANS FOR HIGHLY VULNERABLE DISTRICTS PROJECT TO IMPLEMENT COASTAL INFRASTRUCTURE MANAGEMENT PLANS FOR HIGHLY VULNERABLE DISTRICTS

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Infrastructure development is critical for private sector development. More importantly, the provision of services such as water, electricity, road transport, shipping services and telephone communication, is considered an effective vehicle for redistribution of national wealth. Consistent with the theme of ensuring that the community shares the benefits of development, infrastructure development will be rigorously pursued to ensure that it will benefit all Samoans. Currently, a high proportion of Samoa is serviced by tar-sealed road systems; a well developed shipping service linking both islands; 80% of country has access to potable water; and telephone systems that extend to the rural areas (refer to Annex II, Synthesis Report 2004).

Samoa is prone to frequent cyclones, and Cyclones Ofa and Val in 1990 and 1991 respectively, which were 50- and 100-year events, caused a total of \$440 million of damages (four times the GDP) and 23 fatalities. Most of the damage affected infrastructure, communication and electricity. Coastal and waterway erosion also pose risks to communities and infrastructure in the coastal zone. Activities such as land reclamation and wall construction, sand-mining, discharge of water disturb natural currents and deposition processes, potentially exposing parts of the coast to greater risk. Risk exposure will continue to rise if economic and social activities are allowed to expand uncontrolled into areas subject to natural hazards (IDA IAM PAD 1999).

MNREM in collaboration with other government ministries has developed plans (Infrastructure Asset Management Project, IAMP) for Samoa that identify location of key infrastructure and asset and aim to maximize protection of government assets. The information collected during the IAMP focused on preparing CIM Plans for 15 districts of Samoa. The remaining 28 districts is to be implemented under the Second Infrastructure Asset Management Project (SIAM-2) beginning early 2005.<sup>1</sup> Of the 15 districts each has a detailed CIM Plan and implementation guideline.

Under the auspices of the Infrastructure Asset Management Project, an assessment of Coastal Hazard Zones for Samoa was conducted by the MNREM through consultancy services in 2000. This activity produced Coastal Hazard Zone (CHZ) maps, along with creating a Coastal Hazard Database (CHDB) and Coastal Sensitivity Indices (CSI) for the entire 573km coastline of Samoa. The project identified strategic and planned actions required for creating sustainable coastal communities. A key fact found during this assessment was that a 0.49 rise in global sea-level above 1900 levels by 2100 is likely to result in an enhancement of existing beach erosion rates by about 3-22m for sheltered lagoon beaches and 10-23m for open-exposed beaches. This is indicative of how climate change will affect Samoa in the immediate future

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<sup>1</sup> For more information see <http://www.MNREM.gov.ws/projects/siam-2/info.htm> under the sub-heading "Coastal Infrastructure Management (CIM) Plans".

particularly during the months of November to March typically coined the “cyclone season”.

#### RATIONALE

This project profile is consistent with Samoa’s national Coastal Infrastructure Management Strategy (CIM Strategy, January 2001). The strategy has as its central vision “Resilience – Coastal Infrastructure and Communities Resilient to Natural Hazards”.

*“To be resilient is to be adaptive, responsive and quick to recover so that communities are environmentally, socially and economically sustainable”  
(CIM Strategy, January 2001).*

As there are 15 CIM Plans for 15 Districts, this project profile focuses on implementing CIM Plans for districts that have been identified as ‘highly vulnerable’ as measured by a high Coastal Sensitivity Index (CSI).

#### DESCRIPTION

##### Key Objectives

1. To review the best solutions identified in the CIM strategy implementation guidelines for action improving resilience in highly vulnerable districts;
2. To implement urgent CIM plan activities in highly vulnerable areas;
3. To use educational programs to improve the districts awareness of coastal hazard risks; and
4. To enable the community and infrastructure providers to reduce coastal risks in the district.

##### Expected Outcomes

- An improved coastal environment;
- Established lifeline services outside the Coastal Hazard Zones (CHZs);
- Residential developments raised and mitigating flooding hazards;
- Availability of sand sources for domestic use;
- Improve condition of roads;
- Incremental relocation of community and government assets outside the CHZs;
- Strong sense of community responsibility and ownership for coastal processes and coastal management.

Suggested Actions Required	Indicators / Expected Outputs	Potential Long-term Outcomes
To undertake all appropriate actions identified in the CIM plans for highly vulnerable districts;	Effective management of coastal zones in vulnerable areas in the District with the use of planning solutions and hard-structural solutions; Protected coastal infrastructure; A trend of inland retreat or relocation;	An improved coastal environment; Established District clinic outside the CHZ; Residential developments are raised and mitigated from flooding hazards; Sustainable source of sand is available for domestic use;
To inspect current status of culverts and where necessary an upgrading of culverts and drains;		
To implement education programme;		
To identify road maintenance, investigate constructing new inland road with consultation with villages on final route;		

To prepare an EIA for the propose road;	New individual and community development build foundations are at a level that takes into account the Coastal Flooding Hazard Zone in the area of buildings; Training and skills transfer to counterparts and the community.	Better condition of local roads; Incremental relocation of community and Government assets outside the CHZs; Strong sense of community responsibility for coastal processes and to coastal management.
To develop wetland monument plans		
To work collaboratively with telecommunication providers for provisions of underground telephone services and expansion of mobile telephone network;		
To work collaboratively with EPC for provision of underground electrical lines and expansion of electric power service;		
To identify a new site for relocation of districts hospitals and or clinics outside of the hazard zones;		
To ensure control of commercial sand mining and enforcement of permit infringements.		

### IMPLEMENTATION

#### **Institutional Arrangement**

Implementing Agency: MNREM, MWTI

Coordinating Agency: MNREM

The Ministry of Natural Resources, Environment & Meteorology to be the implementing agency with cross-sectoral collaborative involvement with Ministry of Works, Transportation, and Infrastructure and other Government corporations. The District CIM Plan Committee (consisting of village representatives) and Government shall be responsible for making decisions and recommendations on issues and subjects including, but not necessarily limited to:

- Inputs on the best ways to improve coastal resilience;
- Advise on the possible ways to engage broad-based awareness;
- Assist with consultations of project profile; and
- Review of project profile as circumstances changes.

#### **Risks & Barriers**

- Lack of District ownership of the project;
- Isolation of the District;
- Political will and commitment;
- Tropical cyclones or extreme climatic events;
- Lack of Engineers within the Ministry to supervise and manage contracts;
- Lack technical skills on contract management for works and services;
- Rock seawalls tend to be preferred by communities for their perceived protection, but they have high physical and visual impact on the beach environment and can be counterproductive;
- Rock Seawalls build by villagers lack design standards and were easily affected by waves during the cyclone.;
- Land ownership and tenure issues;
- Communities preference for coastal location to access marine resources;
- Lack of collaboration between sectors involved.

#### **Evaluation and Monitoring**

- Work undertaken must reflect a balance between community needs / outcomes and strengthened resilience of the coastal environment;
- Five yearly CIM Plan review;

- Project status review monthly;
- Established CIM committee in highly vulnerable communities and districts.

**COST**

**Indicative Budget**

*Proposed Funding (Technical Assistance): USD 450,000*

<b>Activity</b>	<b>Costs (USD)</b>
To undertake all appropriate actions identified in the CIM plans for highly vulnerable districts;	150 000
To implement education programme;	100 000
To work collaboratively with telecommunication providers for provisions of underground telephone services and expansion of mobile telephone network;	50 000
To work collaboratively with EPC for provision of underground electrical lines and expansion of electric power service;	50 000
To identify a new site for relocation of districts hospitals and or clinics outside of the hazard zones;	100 000
<b>TOTAL</b>	<b>450 000</b>

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

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## NAPA PRIORITY PROJECT NO. 9

### INFRASTRUCTURE PROJECT 1

#### RELOCATION OF LOCAL COMMUNITIES

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Localization: Santa Catarina, Malanza, Sundy, Praia Melão, Praia Pesqueira e Ribeira Afonso

Sector: Infra-structures and Public Works

Domain: Adaptation to Climate Change

Type: Community/ Social

#### JUSTIFICATION

For occasion of torrential rains and invasion of coast and beach at Santa Catarina e Malanza; consequently, it cause floods as the sea level rise. This community of fishermen, farmers that have to stop their activities, and put their family at risk of subsistence.

The poverty level of that local community requires extra interventions in terms of construction of infrastructures, since related with climate change. As a case occur at Praia Pesqueira, the house was reached by a ray in March of 2005, this is a good example. Another case occurs at Praia Melão, where many canoes were destroyed, and others should be giving to the owners. At Ribeira Afonso, Praia Melão and Praia Colónia, many houses are in risk of floods and need urgent intervention.

A construction of new homes as well as the communities' displacement, to face the Climate Changes phenomenon is necessary.

#### DESCRIPTION

##### **Objectives**

To introduce measures to allow the local communities to face the phenomenon of climate changes, reducing the exposition of those populations to the marine floods and the rivers full.

##### **Elaboration of notebooks of responsibilities, for:**

Equipping the new chosen areas for the construction of new houses.

##### **Activities**

Construction and gives the new houses to the identified local communities' residents.

To supply electrical energy and water to the new homes.

Relocation of population at risk of flood.

##### **Expected results**

Vulnerable coastal populations put back in protected areas of the consequences of the climate phenomenon.

The communities' compensated of the harmful effects of the climate changes.

##### **Execution**

The execution controls of the project will be entrusted to Direcção de Obras Públicas e Urbanismo (D.O.P.U.) - Public Works and Urbanization Cabinet-, that will select the companies after acquisition of responsibility notebooks.

**Institutional framework**

The technicians of DOPU will elaborate the notebooks of responsibilities and they will drive the contest, release to the evaluation of proposals of the companies and award of the several works.

The national technical personnel's participation will be remunerated properly for execution and control of the project.

The identification of appropriate spaces for construction the group of the infrastructures will constitute task of the Geographical Services - Serviços Geográficos e Cadrastais.

The displacement of fishermen communities will need an appropriate sensitization campaign.

The new places should permit the main everyday activities of the communities' members.

**Risks and obstacles**

The choice of the models of the houses should have in consideration the lifestyle and the models previous of the communities.

Shortage of water and energy.

Reports presented from the inspectors teams of DOPU.

**Monthly fishing campaigns**

Indicators for Monitor Regularity in the communities' daily activities.

**Duration**

6 months

**COST**

*USD 500,000*

# SAO TOME E PRINCIPE

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NAPA PRIORITY PROJECT NO. 10

FISHERIES SECTOR PROJECT 1

CONSTRUCTION OF INFRASTRUCTURES FOR PROTECTION OF  
VULNERABLE COMMUNITIES

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## JUSTIFICATION

The effects of coastal erosion, the floods and the invasion for the marine waves have been coming to echo in the reduction of the resources of fishermen and of their families, taking them impoverish every day that passes, the current advantages of this project would allow to overcome the situation. For the effect, the present project interferes in a complementary action to the vast program of Government for the protection of the coastal area of S.Tomé and Príncipe, in peculiar of the fishing affected communities. It is intended with it the gradual construction of harbors and protection barriers, as well as the recovery of the parks of canoes of the communities' of Pantufo, Malanza and Ribeira Afonso.

This action will obey previous multidisciplinary consultancy, to establish of execution plans and methods to proceed for the execution of the project. This will request implantation the specialists' technical support and it should be implemented in narrow collaboration with institutions connoted with the theme, among them the Ministry of Infrastructures, the local autarchies, etc.

## DESCRIPTION

### **General Objective**

The protection of coastal areas and target communities of S.Tomé and Príncipe.

### **Specific objective**

- To involve the target groups in the preservation and treatment of the spaces destined to the disembarkation and parking of the canoes;
- To lock or to reduce the progress of degradation of the coast, through the completion and construction of protection barriers;
- To improve the parks of the embarkations of craft fishing and installation of harbors;
- To build bridges for fishing fleets in the degraded areas and to facilitate the permanence of the fishermen in their origin communities.

### **Long term potential effects**

- Reduction the more than 50% of the number of that are dislodged of their origin beaches;
- Development of new economics activities in the communities of fishermen and, consequently, of standard of living of their members, elevating in more than 60% the respective income;
- Increase of the year of life of the canoes.

### **Institutional framework**

The project is framed in the Government's program, particularly in the domain of the fishing and infrastructures, since the group objective is the craft fishermen.

It is treated, on the other hand, of a priority action that it seeks to reduce the poverty.

### Risks

Lacks or financing inadequacy

Inadequate control in execution of norms for an effective work conclusion

Evaluation and continuation

### Evaluation and monitoring

General Objective	Specific Objective	Expected Results	Activities	Indicators			Cost (USD)
				Actual value	Source	Value to reach	
To protect the coast target communities of São Tomé and Príncipe	1- Develop participative preservation of canoes parks.	Sensitized 60% of communities leaders in the preservation process	-Sensitization - and organization of community -Selection of teams work - Training -Execution of parks management	2 protected zones exist: one in Príncipe island and other in São Tomé	Inquiry	More 6 zones: 2 in Príncipe and 4 in São Tomé	60 000
	2- Reduction of coastal erosion and degradation of embarkations parks	-More than 50% of target zone rehabilitate; -4 barriers constructed.	- Study and map of the zone; -Elaboration of rehabilitation plan and barriers to be constructed	Doesn't exist		-6 parks rehabilitated; -3 barriers constructed	130 000
	3- Improve anchors parks for craft fleets	Anchors constructed and ready to be used by craft fishermen	-Organization of target zones; -Elaboration and approbation of anchors plan; -Execution, monitor of actions; -Monitor final report	Doesn't exist		More than 10 anchors at all country	110 000
<b>TOTAL</b>							<b>300 000</b>

### COST

*USD 300,000*

# SAO TOME E PRINCIPE

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## NAPA PRIORITY PROJECT NO. 12

### INFRASTRUCTURE PROJECT 3

#### ESTABLISHING THE AGRO- TOURIST COMPLEXES AT MONTE CAFÉ AND PORTO REAL

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Location: Agricultural company Monte Café, in S.Tomé, and Porto Real, in the Príncipe.  
Sector: Tourism and Agriculture  
Domain: Economic  
Type: Poverty Reduction

#### JUSTIFICATION

The presentation of a new tourist product, based on the agriculture-tourism, innovator and original, tends in view to contribute in the combat against the drought and poverty reduction in the rural area, promising to be a good choice of the National Adaptation Plan of Action (NAPA).

On the other hand, the project will help the Government in the revitalization, rehabilitation and transformation of the agricultural infrastructures and it will build hotel infrastructures in referred companies.

#### DESCRIPTION

##### **Composition and activities**

- To reduce the effects of the drought on the cultures;
- To provide to the tourists a different tourist package, with attraction inserted in the agrarian way and nature motivations out of the common.

##### **Objectives**

- To improve the contribution of the agricultural sectors and the tourism in GDP;
- To involve the local population in a new activity type;
- To create new workstations and to reduce the poverty in the rural area;
- To training and inform the population on the drought effects;
- To consider the implantation as a pilot experience, whose success will depend on the existence of futures compounds;
- To rehabilitate the facilities and to adapt them to the actual needs.

##### **Activities**

- To sensitize the population for the advantages of the new activity;
- To wake up in the population new energies and to obtain of her suggestions for new activities;
- To create a young nucleus, with creativity, capable to always present new attractions;
- Diversified tourist package and better;
- Contribution of the sectors in increased GDP;
- Larger affluence of tourists.

**Expected results**

Motivated population and involved.  
 Reduced of drought in those companies.

**Execution**

Tourism and Hostelry Sector, together with agricultural companies involved in the process, will proceed to the fittings and constructions judged necessary and constant of notebook of responsibilities to be elaborated under the coordination of two sectors.

**Institutional Framework**

Tourism and Hostelry will elaborate an appropriate tourist brochure and it will proceed to purpose internal popularization and in the exterior, in way to attract the potentials tourists.

DOPU will be called to grant the construction authorizations and to proceed the control, to define jointly The indifference of the populations can harm the process.

**Risks and obstacles**

The quality of the popularization can determine the success of the package.  
 Difficulties in obtaining financing will constitute a blockade to accomplishment.  
 Satisfied tourists with the quality of the presented services and motivated with the diversification and originality of the tourist offer.

**Indicators to Monitor**

Frequency of action of the local cultural groups and the increased area.  
 Drought locked in those tourist areas or agricultural companies.

**Duration**

9 months

**COST**

<i>USD 600,000</i>
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# SIERRA LEONE

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## NAPA PRIORITY PROJECT NO 2

### REHABILITATION & RECONSTRUCTION OF METEOROLOGICAL/CLIMATE MONITORING STATIONS THROUGHOUT THE COUNTRY

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#### RATIONALE/JUSTIFICATION

The Meteorological Department used to have eleven (11) synoptic stations, three (3) Agro Met stations and two (2) upper air stations all over the country for monitoring of the country's weather/climate phenomena. There were plans to open five (5) more synoptic stations in order to get an even distribution of stations in consonance with WMO improved standard of 1994. However, during the war almost all of the existing stations were destroyed. At the moment only five (5) are operational (Lungi Air Port, Bonthe, Bo, Freetown and Makeni), with none of the upper air functional.

In order to fully monitor and contribute to the adaptive capability of the country to climate change, a good network of meteorological stations fully equipped to adequately monitor the parameters responsible for initiating and propagating the change is therefore very imperative. The Sierra Leone government is expected to establish the two upper air stations at Lungi and Daru as local contribution apart from the payment of the salaries of these staffs.

#### DESCRIPTION

##### Objectives

The main objective of the Project is to rehabilitate and improve the Meteorological/Climatic data collection, data analysis and storage of the country in order for the department to carry out its obligations towards the NAPA project

To meet this objective, the following specific objectives will be achieved by the end of the project phase of two (2) years:

- The rehabilitation of six (6) meteorological stations at Daru, Sefadu, Yele, Kabala, Njala and Shenge:
- The establishment of five more stations at Nitty, Bakuma, Sulima, Kamakwie and Kailahun in order to give a full coverage of station network representative of WMO standard.
- The provision of adequate equipment and logistics for each of these stations to function properly.
- The provision the necessary tools and office logistics for the collection, analysis, storage and dissemination to end-users of weather/climate data and information.

##### Activities

There are three (3) Components to this project viz: (a) Rehabilitation of old Station and opening of new stations to meet WMO standard (b) The provision of tools and equipment for these stations and (c) provision of logistics for the running of the established stations which include those for: data analysis, dissemination to end users and data storage. The components involve are outlined in the detail budget.

**Input**

Human, Material and Financial Resources

**Short-term output**

Improvement of meteorological/climate data collection, storage and analysis

**Potential long-term outcomes**

Rehabilitations of existing meteorological stations and establishment of new ones.

**IMPLEMENTATION****Institution Arrangements**

The Meteorological Department of the Sierra Leone will be the lead executing agency. It will collaborate with other agencies which include the Water Resource Department, Environment Department, Faculty of Environmental Science, Njala University, Guma Valley Water Company, Sierra Leone Water Company (SLWACO).

The Potential Regional/International Partners will include the World Meteorological Organization (WMO) United Nations Environmental Program (UNEP) and the Mano River Union Basin Organization.

**Risks and Barriers**

Some of the risks involve are the remoteness of some of the stations which make them vulnerable to thieves. The involvement of the local people of the areas in the provision of security for the said stations will clear this risk. The sustainability of the project is certain as after the provision of the various components mentioned the simple task of maintenance and daily administrative cost of these stations could be met from that of the department's annual allocation from the central government.

**Monitoring and Evaluation**

The project will be monitored by competent national agencies. A set of criteria will be developed to be used as tools for project evaluation.

**COST**

The Total cost of the project is Five Hundred and fifty-six thousand, one hundred and sixty US Dollars (\$ 556,160.00) only and will last for two (2) years

*This project is estimated to cost USD 1,231,651*

**Budget Breakdown**

	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Rehabilitation of 6 stations	111 600	122 760	135 036
Upgrading of existing operational stations	33 800	37 180	40 898
Establishment of 5 new stations	108 000	118 800	130 680
Cost of rainfall station equipments	39 000	42 900	47 190
Cost of office materials/logistics	54 700	60 170	66 187
Workshop instruments	25 000	27 500	30 250
<b>Total</b>	<b>372 100</b>	<b>409 310</b>	<b>450 241</b>



## SOLOMON ISLANDS

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### NAPA PRIORITY PROJECT NO 6: INFRASTRUCTURE DEVELOPMENT

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#### *Goal*

*To improve the resilience of key infrastructure to climate change and sea-level rise.*

#### *Rationale*

Solomon Islands will struggle to cope with already highly variable climate, costing millions of dollars. Climate variability and change will exacerbate pressure on sensitive environmental and human systems including key infrastructure. Many of its roads, bridges, airports and wharves are built in or near disaster prone areas. Thus the protection and resilience of these infrastructures will be important for achieving sustainable development in the long term.

#### *Description*

Coastal zones in the Solomon Islands are often subject to adverse impacts of climate change and variability including extreme events such as tropical cyclones. Adverse impacts result from land loss due to inundation, coastal erosion, saltwater intrusion as a result of wave-overtopping and sea water flooding of both infrastructure and socio-economic activities. In most islands, coastal zones provide a lifeline infrastructure including harbours to much of their economies. Some of the provincial airports are located at or near the coastline.

Climate proofing the infrastructure will pave the way for a least cost design and implementation procedure integrated or mainstreamed into existing planning, design and implementation processes that take into account increased risk from climate change. The consequences of inaction or not taking into account climate change risks in an already vulnerable situation will result in high overall costs, including any rehabilitation costs which are likely to occur during the lifetime of the airport. This would enhance the livelihoods, improve adaptive capacity and foster sustainable development in the long term. The activities may include engineered design criteria that would allow for a 60-year storm event with particular wave heights for seawalls, hardstand/surface, retaining walls as well as a breakwater for dissipation of wave energy.

Other adaptation activities will include construction of coastal/flood protection/defence systems, gravelling and upgrading of seawall/access

roads, strengthening of surface area and climate proofing drainage and other protective infrastructure.

**Objective:** Integration of climate change risk proofing into infrastructure design and development.

**Outcome 1:** Improved operational safety and efficiency of airport and airport facilities.

**Outputs:**

- 1.1 Climate proof design criteria for airport development with a 60-year recurrence interval developed and used.
- 1.2 Coastal/flood protection systems constructed.

**Outcome 2:** Constructing of an engineered protective structures in the harbour and coastal areas.

- 2.1 Detailed survey of the island coastal system to identify built up areas surveyed.
- 2.2 Protective seawalls, revetments, culverts, bulkheads, jetties and floodgates constructed.
- 2.3 Drainage system for the protection of airport built.

**Outcome 3:** Climate proof key infrastructure.

**Outputs:**

- 3.1 Foreshore vegetation replanted.
- 3.2 Seawalls or other protective measures in built-up areas or critical socio-economic infrastructure and activities constructed.
- 3.3 Land-based pollution prevented
- 3.4 By-laws and/or regulations governing siting of infrastructure developed and implemented.
- 3.5 Climate change and sea-level rise impacts integrated into environmental impact assessments.
- 3.6 60-year return interval in all infrastructure design and implementation adopted and implemented.

**Implementation:** See Chapter VII.

***Sustainability of the programme***

Development of infrastructure remains a key concern of the government. However, there are some risks such as sufficient political stability, continuous

donor support, sound financial management, capacity and capabilities of the responsible agency and/or ministry and problems of high staff turnover. While the latter pose some risks to the sustainability of the programme, climate change will in no doubt have adverse impacts on key infrastructure. This will necessarily mean that livelihood and the economic activities will be compromised. The negative impacts of climate change and sea-level rise seem greater than those posed by the risks involved and therefore building resilience should not be delayed. Thus incorporation of climate change and sea-level rise in the design and construction should be the norm.

### ***Budget***

The total amount of funds to be requested from the LDCF is approximately USD1 million. Co-financing will be provided by other bilateral development partners and the national government.