



## NATIONAL ADAPTATION PROGRAMMES OF ACTION

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

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# BANGLADESH

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## NAPA PRIORITY PROJECT No 2

### PROVIDING DRINKING WATER TO COASTAL COMMUNITIES TO COMBAT ENHANCED SALINITY DUE TO SEA LEVEL RISE

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#### TYPE OF PROJECT

Intervention (with awareness raising and policy elements)

#### RATIONALE

Ground and surface water in coastal areas is affected by salinity intrusion through rivers and aquifers. With the current increase in climate change and sea level rise, people in the coastal areas will severely suffer from scarcity of safe drinking water. Given this situation, finding alternative sources (e.g. rainwater harvesting, surface and ground water treatment) of safe drinking water is essential for the safety of present and future generations. Therefore, a comprehensive strategy should be developed for access to safe drinking water from alternative sources.

#### DESCRIPTION

##### **Objectives and activities:**

Development of a comprehensive strategy for safe drinking water supply in coastal areas

##### **Inputs and Activities:**

- Multi-disciplinary expertise;
- Water resource development expert for identifying alternative drinking water sources;
- IWRM expert for assessing options for integrated water resource development;
- Public health expert for incorporating health issues with drinking water sources development strategy;
- Identification of existing drinking water sources;
- Review of existing technical capabilities to utilize safe drinking water sources;
- Understanding community interest to alternative sources;
- Review of national plans and policies;
- Develop short and long term strategy for alternative source of safe drinking water;
- Development of alternative source of safe drinking water.

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

- In-depth potable water resource availability and alternative options;
- Safe drinking water sources for present use.

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

- Improved management system for safe drinking water supply;
- Improved preparedness programme for drinking water supply in crisis situation.

### IMPLEMENTATION

#### **Institutional arrangement**

Primary implementing Agency: DPHE

Secondary implementing Agencies: LGED, BWDB, NIPSOM, NGOs and Local Community

#### **Risks and barriers**

Lack of comprehensive knowledge base for developing strategy

#### **Evaluation and monitoring**

A committee formed by MoLGRD and Ministry of Health and Family Welfare

### COST

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

*Full project: USD 1,500,000*

*Project design: USD 25,000*

# BENIN

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## NAPA PRIORITY PROJECT 3

### P3-SECTEUR- RESSOURCE EN EAU

#### MOBILISATION DES EAUX DE SURFACE AUX FINS D'ADAPTATION AUX CHANGEMENTS CLIMATIQUES DANS LES COMMUNES LES PLUS VULNÉRABLES DES DÉPARTEMENTS DU CENTRE ET DU NORD.

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#### OBJECTIF GENERAL

Renforcer la disponibilité de l'eau pendant les périodes sèches aux fins d'adaptation des populations aux changements climatiques.

#### CONTEXTE ET JUSTIFICATION

En République du Bénin, il existe encore une frange considérable de la population dont les sources d'approvisionnement en eau, en milieu rural, sont les puits non protégés et les plans et cours d'eau. Selon le RGPH3, les puits non protégés contribuent à 22,6% aux besoins en eau et les plans et cours d'eau à 13,2% en moyenne. Ces puits et plans d'eau exploités par les ménages tarissent très vite pendant la période de sécheresse qui constitue l'un des risques climatiques majeurs au nord et au centre du pays. Des travaux portant sur les modifications pluviométriques des années 70 (Le Barbé et al, 1993) montrent que le Bénin a subi une réduction de 20% des précipitations entre 1970 et 1990 impliquant une diminution de 40% des écoulements. Les études de vulnérabilité réalisées au Bénin en 2001 (CNI<sup>1</sup> du Bénin, 2001), font état d'une réduction des précipitations de l'ordre de 20 à 30% au niveau national d'ici 2025. En conséquence, les ressources en eau subiront une réduction de 40 à 60%. Il urge donc de mener des actions de maîtrise de l'eau au profit des populations. Cet état de choses justifie l'intérêt du gouvernement à considérer l'accès à l'eau comme une priorité de l'Etat. Aussi, dans le cadre du projet pilote d'adaptation aux changements climatiques mis en oeuvre dans le nord-ouest du Bénin (Communes de Tanguiéta et de Ouaké), il a été élaboré un outil pédagogique sur la thématique « Changement Climatique et Cycle de l'eau » qui constitue un acquis à capitaliser.

Le présent projet vise à mener des actions qui permettent d'augmenter la durée de disponibilité de l'eau pendant la saison sèche et de favoriser la recharge des nappes phréatiques. Ce projet se justifie d'autant plus qu'il rentre dans le cadre de la Stratégie de Croissance et de Réduction de la Pauvreté (SCRPR).

#### DESCRIPTION

##### **Localisation**

Les Communes les plus vulnérables des Départements de l'Atacora, des Collines, de l'Alibori, de la Donga et du Couffo.

##### **Groupes bénéficiaires**

Populations rurales et exploitants agricoles, pêcheurs, et autres couches vulnérables.

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<sup>1</sup> Communication Nationale du Bénin

### Objectif global

Le présent projet vise à renforcer la disponibilité de l'eau pendant les périodes sèches aux fins d'adaptation des populations aux changements climatiques.

### Objectifs spécifiques

Le projet vise de façon spécifique à:

- Sensibiliser les populations à un changement de comportement pour une utilisation rationnelle et durable de l'eau;
- Rendre l'eau disponible pendant les périodes arides.

### Activités

1. Education et sensibilisation des populations à la gestion rationnelle et durable de l'eau;
2. mise en place des micros ouvrages de stabilisation des berges des plans et cours d'eau;
3. reboisement des berges des plans et cours d'eau;
4. renforcement des capacités des collectivités locales à la gestion durable des ouvrages installés;
5. promotion des activités de contre-saison.

### Moyens: (Matériels, humains et financiers)

- Ressources humaines: Hydrologue, Environnementaliste, Agroéconomiste, Aménagiste, Juriste, Sociologue, Forestiers, Génie rural, organisation paysanne.
- Moyens matériels: les moyens de déplacement, les matériels didactiques et les équipements informatiques.
- Ressources financières: le coût estimatif du projet est de **USD 2 875 000**.

### Sources:

LDCF 50% (**USD 1,437,500**) ; Cofinancement 50% (Budget National, coopération bilatérale et multilatérale, populations bénéficiaires) soit **USD 1,437,500**.

Le détail du budget se présentent comme suit:

Activités	Total (USD)
Education et sensibilisation des populations à la gestion rationnelle et durable de l'eau	50 000
Promotion des activités de contre-saison	100 000
Mise en place des micros ouvrages de stabilisation des berges des plans et cours d'eau	1 200 000
Renforcement des capacités des collectivités locales à la gestion durable des ouvrages installés	50 000
Reboisement des berges des plans et cours d'eau	700 000
Coordination et gestion	550 000
Suivi et évaluation	225 000
<b>TOTAUX</b>	<b>2 875 000</b>

### Impacts

- La durée de disponibilité de l'eau est augmentée pendant la saison sèche;
- les sources de revenus sont diversifiées.

**MISE EN OEUVRE ET EXECUTION**

**Ancrage institutionnel**

**Agence de mise en oeuvre:** Direction de l'Environnement (DE/MEPN).

**Agence d'exécution:** les collectivités locales en collaboration avec la Direction du Génie Rural (MAEP) et la Direction de l'Eau.

**Comité de pilotage:** Ministère en charge de l'environnement, Ministère en charge de l'eau, Ministère en charge de l'agriculture, Partenaires au développement, Elus locaux, membres Comité National Changements Climatiques, SNG, Cellule chargée du suivi et de l'évaluation.

**Analyse des risques et obstacles**

Les risques et obstacles prévisibles sont : le retard dans le décaissement des fonds ; mobilisation de la contrepartie locale ; lourdeur administrative, aspects socioculturels.

**Suivi et évaluation**

Indicateurs:

1. nombre de comités de gestion installés et fonctionnels;
2. nombre de personnes sensibilisées et nombre de séances de sensibilisation organisées;
3. nombre de plants mis en terre et ayant survécus;
4. superficie de berges de plans d'eau protégées.

Mécanisme:

- • enquêtes de terrain;
- • Réunions de concertation;
- • évaluations à mi parcours et évaluation finale;
- • Rapport d'activités ou de missions.

**Durée**

La durée du projet est de 3 ans.

**COÛT**

*USD 2,875,000*



# BHUTAN

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## NAPA PRIORITY PROJECT NO. 6

### RAINWATER HARVESTING

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#### RATIONALE

Drought and dry spells are common in the mountainous areas of Bhutan where people depend primarily on rain fed subsistence agriculture. It was, therefore clear that a simple and affordable rainwater harvesting system combined with an integrated approach to improving agricultural production would significantly improve the lives of local farmers. Most farmers have traditionally relied on unfavorably distributed seasonal rainfall. About three-quarter of the rain falls between June and September each year, often in the form of heavy downpours. Due to the rugged terrain and the geological conditions it is both difficult and expensive to divert water from other watersheds. There is water shortage during the most critical part of crop growth and development, particularly during spring when sowing and planting activities are performed. Early or late monsoon can also disrupt the normal schedule of work and progression in the physiological development of plants. Under abnormal weather conditions, water stored during periods of excess availability can safeguard farmers from crop failures, loss of animal productivity and have safe drinking water.

The RWHTs is associated with the process of supplementing domestic/household water requirement through collecting rainwater, treatment and storage as part of a wider drinking water supply program. The purpose in the present context is to ensure that farmers have sufficient water to maintain agricultural production in times of water shortages due to seasonal and inter-annual climate variability or longer-term impact of climate change. Rainwater harvesting may also help control erosion and flooding during periods of excessive rainfall.

There are various technologies adopted successfully in various parts of the world, like:

- Micro-catchment runoff farming water harvesting systems
- Macro-catchment runoff farming water harvesting systems
- Floodwater harvesting runoff farming (also called large catchment water harvesting or spate irrigation)

Some of these techniques and their localized variants are practiced by farmers in Bhutan. However, the scientific rationale and necessary details are often overlooked to effectively realize the potential benefits of these technologies. This proposal is an attempt to bridge the existing gaps and provide an adaptation option to water deficits caused by variability and change in the climate system.

#### DESCRIPTION

##### **Objectives**

To safeguard farmers from water shortages during dry periods and irregularities in the monsoon rainfall, thereby improving household food security and income of farmers living in vulnerable areas.

##### **Activities**

- Small scale irrigation development based on RWHTs;

- Strengthen farmers involvement and research and extension services;
- Vulnerability assessment;
- Land survey;
- Rural credit;
- Project management;
- Identification of areas vulnerable to dry spells and erratic monsoon rainfall;
- Aerial surveys and evaluation of remote sensing images/photographs to determine areas suitable for water harvesting;
- Assessment of available and proven Rainwater Harvesting Technologies (RWHTs) for adoption;
- Technological adaptation to fit the needs and requirements specific to each vulnerable locations;
- Research new designs and package improved technologies (studying and modeling runoff behavior);
- Establish farmers' capacity to mobilize local resources for technology adoption and actual application;
- Demonstration of emerging technologies like supplemental water system, dual purpose system, combined system, modeling;
- Training farmers in the maintenance of their investments in RWHTs, and effective utilization of harvested rainwater;
- Economic analysis of rain water harvesting techniques.

#### **Inputs**

The main inputs are technical expertise; RWHT incorporated structures, farmer's participation, training, research and development, land, labor, finances and credit facilities. Inputs in the technology design include: topography of the area; soil type, texture, water holding capacity, soil depth, infiltration characteristics, hydraulic conductivity; climate data (at least 15 years), evaporation, transpiration; crop, its root depth, growing season, and critical growth stages.

#### **Outputs**

- Increased awareness and knowledge of RWHTs among farmers;
- Higher crop and animal productivity under rainfed agriculture;
- Safe drinking water and less health problems;
- Increase in rural income;
- Improved national food security status;
- Synergy with actions under the UNCCD;
- Environmental benefits such as reduced soil erosion, soil salinity and recharge ground water.

### **IMPLEMENTATION**

#### **Institutional arrangements**

Implemented by research and development agencies of the MoA in collaboration with farmers, dzongkhag administrations outside technical assistance. Investment in rain-fed areas, policy reform, and transfer of technology such as water harvesting runoff farming require stronger partnerships between agricultural researchers and other agents of change, including:

- local organizations,
- farmers,

- community leaders,
- NGOs,
- national policymakers and
- donors.

#### Risks and barriers

- Under extreme dry seasons, rain water harvesting may fail;
- Government policy review in view of constructing contemporary irrigation channels vis-à-vis support to runoff farming systems;
- Labor shortage;
- Non-participation from the beneficiaries;
- Cooperation between farmers, the state and the scientific community;
- Insufficient attention to social and economic aspects.

#### Monitoring and evaluation

This will be done by the MOA via its normal methods of:

1. Progress reports
2. Technical and financial reports
3. Beneficiary interviews
4. Socio-economic impact survey

#### COST

*USD 895,000*

#### Budget breakdown

<b>Activities</b>	<b>Year 1</b> (USD)	<b>Year 2</b> (USD)	<b>Year 3</b> (USD)
Small scale irrigation development based on RWHTs	50 000	100 000	200 000
Strengthen farmers involvement and research and extension services	100 000	150 000	50 000
Vulnerability assessment	25 000	-	-
Land survey	25 000	10 000	-
Rural credit	-	-	150 000
Project management	10 000	10 000	15 000
<b>TOTAL COST</b>	<b>210 000</b>	<b>270 000</b>	<b>415 000</b>

# BURKINA FASO

## NAPA PRIORITY PROJECT 6

### LUTTE CONTRE L'ENSABLEMENT/ENVASEMENT DES COURS D'EAU DANS LES BASSINS NATIONAUX DU MOUHOUN, DU NAKANBÉ ET DE LA COMOÉ.

#### 1. JUSTIFICATION

Le Burkina Faso est drainé par trois cours d'eau internationaux que sont la Comoé (régime permanent, le Niger et la Volta (régime permanent en partie). De ce fait, le pays a une grande obligation et responsabilité en matière de gestion partagée avec tous les pays qui l'entourent dans un esprit de paix et de coopération bien comprise.

Les effets des chocs climatiques sur les sols et la foresterie observés depuis plus de quatre décennies ont abouti à une dégradation significative des sols et à une régression notable du couvert végétal notamment herbacée. En outre, la pression démographique a poussé dans un élan d'adaptation à ces effets (baisse de fertilité des sols, baisse et irrégularité des pluies, ...) la population rurale en particulier (près de 80% de la population totale) qui exerce dans l'agriculture et l'élevage traditionnels, à une exploitation non rationnelle des terres et des pâturages (augmentation de superficies agricoles, cultures aux abords immédiats des cours d'eau, etc.).

Il en est résulté de nos jours:

- Une dénudation et une latéritisation importante des sols conduisant à une forte réduction de leur capacité à freiner la force des eaux de ruissellement et des vents violents;
- Par voie de conséquence, un ensablement ou envasement accéléré des cours qui charrient des eaux de plus en plus chargées en matières solides (poussière, sols et débris végétaux arrachés, etc.);
- Une réduction de la capacité de stockage et donc de la fonction de « réservoir tampon » des cours d'eau en cas de crue, conduisant très souvent à des débordements fréquents et à des inondations catastrophiques;
- Une modification des régimes des cours d'eau (tendance à passer d'un régime d'écoulement permanent à un régime d'écoulement temporaire).

Cette situation malheureuse est vécue de façon très marquée dans les bassins du Mouhoun, du Nakanbé (affluents du fleuve Volta) et du Niger. Les populations rurales qui y vivent quotidiennement les conséquences de cette régression physique et fonctionnelle en ont fait un point de sollicitation dans le sens d'une meilleure protection; de même, les décideurs politiques en ont fait un point de préoccupation urgente.

Le bassin du Niger faisant l'objet d'une préoccupation du même type par un programme de l'Autorité du Bassin du Niger (ABN), il est proposé de limiter les actions aux seuls bassins nationaux du Mouhoun, du Nakanbé et de la Comoé.

#### 2. DESCRIPTION

**Objectif général:**

Réduire les actions agressives de l'eau, des vents et des activités humaines sur les cours d'eau.

### Objectifs spécifiques

- Arrêter le processus de dégradation des berges et d'ensablement/envasement des cours d'eau.
- Assurer une protection durable des cours d'eau contre l'ensablement/l'envasement et contre les activités anthropiques de dégradation des berges.

### Activités

- Réaliser une étude d'Avant Projet Détaillé (état des lieux, élaboration du document technique d'exécution, dossier de consultation pour la délimitation, stratégie de mise en oeuvre, suivi- contrôle des travaux, appui pour la gestion ...);
- Mettre en place des périmètres de protection immédiate et rapprochée des berges des cours d'eau;
- Mettre en place des dispositifs et des mécanismes locaux de contrôle et de gestion durable des activités humaines et des outils de protection des cours d'eau (réglementation, mise en place ou renforcement des structures légères d'entretien et de veille, etc.);
- Renforcer par la sensibilisation aux changements climatiques et par la formation, les compétences des acteurs directement impliqués dans la gestion concertée des cours d'eau: communes, services techniques locaux, structures locales pérennes des acteurs (Comité locaux de l'eau, ...).

### Résultats attendus à court terme

- Les cours d'eau disposent au niveau des zones sensibles de leurs parcours, de périmètres de protection de leurs berges contre l'ensablement/envasement et contre les activités anthropiques agressives;
- Les mécanismes et les processus de gestion durable des cours d'eau sont amorcés et opérationnels.

### Effets à long terme

- Les écosystèmes aquatique, terrestre et intermédiaire de la zone humide que constituent les cours d'eau sont préservés;
- La gestion durable, concertée et endogène des cours d'eau en rapport avec les services techniques publics concernés est assurée;
- Les cours d'eau assurent pleinement leur fonction de réservoirs tampon pour les écosystèmes et les activités humaines.

### MOYENS À METTRE EN OEUVRE

Expertise nationale, appui technique et financier, équipements et appui institutionnel.

### 3. MISE EN OEUVRE

#### Arrangements institutionnels

- Maîtrise d'ouvrage: MECV
- Maîtrise d'oeuvre déléguée: Direction Générale des Ressources en Eau et Directions Régionales en charge de l'eau du Sahel (Ministère en charge de l'eau) en étroite collaboration avec les collectivités territoriales concernées, les structures techniques habilitées du Ministère en charge de l'environnement et du cadre de vie, le Ministère en charge des ressources animales;

- Autres ministères à impliquer: Ministère en charge de la recherche scientifique, Ministère en charge de l'administration du territoire et de la décentralisation;
- ONG à impliquer: ONG dont les activités ont un impact sur l'environnement en général et sur l'eau en particulier.

#### Risques et obstacles

Les principaux risques portent sur: (i) la non efficacité éventuelle de la synergie d'action entre les différents acteurs institutionnels d'une part et entre les différentes politiques sectorielles d'autre part, dans la réalisation des différents volets du programme; (ii) la non acquisition des ressources financières nécessaires.

#### 4. SUIVI- EVALUATION

Le suivi-évaluation sera assuré par les services techniques régionaux des ministères respectivement en charge de l'environnement, de l'eau, de l'agriculture, de la pêche, des ressources animales et de l'administration du territoire.

#### 5. RESSOURCES FINANCIÈRES

Désignation	Coût (en USD) et Programmation			
	An 1	An 2	An 3	Sous totaux
Etude APD, contrôle et suivi	20 000	10 000	10 000	40 000
Périmètres de protection immédiate et rapprochée des berges		100 000	50 000	150 000
Dispositifs et mécanismes locaux de contrôle et de gestion durables	20 000	20 000	10 000	50 000
Sensibilisation aux changements climatiques et formation	10 000	20 000	10 000	40 000
Equipements		20 000	20 000	40 000
<b>Total général +10%</b>	<b>352 000 dollars US</b>			

*Contribution estimée des projets et programmes en cours ou prévus: 30 000 dollars US*

*Coût additionnel: 322 000 dollars US.*

# BURKINA FASO

## NAPA PRIORITY PROJECT 11

### MISE EN PLACE DE PÉRIMÈTRES DE PROTECTION ET DE DISPOSITIFS DE CONFORTATION CONTRE LA POLLUTION DES OUVRAGES DE CAPTAGE DE L'EAU SOUTERRAINE ET DE SURFACE (LACS, PUIITS, FORAGES) DANS LES BASSINS COTONNIERS DU BURKINA FASO (MOUHOUN, SUD-OUEST, COMOÉ ET PARTIE EST DU NAKANBÉ).

#### 1. JUSTIFICATION

Une des grandes conséquences des effets des changements climatiques en matière d'eau au Burkina Faso est la précarité des sources traditionnelles d'approvisionnement en eau des populations (baisse des niveaux statiques des nappes phréatiques, forte évaporation et tarissements précoces des lacs d'eau naturels).

Dans le cadre de sa lutte contre ces effets, le Burkina Faso a initié depuis les années 1970, de vastes programmes d'exécution d'infrastructures hydrauliques destinés à l'approvisionnement en eau des agglomérations humaines et au soutien des secteurs importants de développement tels l'agriculture, les ressources animales, la pêche et les industries existantes. A nos jours, le pays dispose d'un parc important de puits modernes et traditionnels, de forages et de barrages.

De même, un certain nombre de nouvelles pratiques agricoles faisant recours aux engrais et aux pesticides ont connu un développement notable, mettant en danger la qualité des ressources en eau souterraine et de surface ainsi mobilisées.

Malheureusement, face aux urgences de la question d'eau qu'a connu le pays lors des grandes sécheresses des années 1970 et celles sporadiques mais récurrentes actuelles, l'aspect préservation des ouvrages de captage contre les pollutions n'a pas été et n'est toujours pas malgré les efforts actuels, à la hauteur de ce qu'il faudrait entreprendre pour assurer aux populations et aux nombreux et multiples usagers, la qualité physico-chimique et bactériologique requise de l'eau mise à leur disposition. Ceci est particulièrement ressenti au niveau des puits ouverts et des lacs d'eau de surface qui sont fortement pollués sur le plan chimique et bactériologique. Cette pollution se manifeste par une forte prévalence des maladies d'origine hydrique dans de nombreuses localités. Par ailleurs, il est également établi que la faune est dans une certaine mesure atteinte par la pollution chimique (pesticides notamment).

Il apparaît donc nécessaire et urgent d'accompagner l'Etat burkinabé dans les efforts qu'il entreprend en vue de combler cette lacune et de réduire sensiblement les maladies d'origine hydriques parfois alarmantes dans de nombreuses zones du Pays. Les régions du Sud-Ouest, des Cascades, du Mouhoun, des Hauts-Bassins et de l'Est du fait de la culture du coton sont les plus affectées. Les nappes phréatiques y sont particulièrement exposées

#### 2. DESCRIPTION

##### Objectif général

Contribuer à l'amélioration sensible de la santé et du cadre de vie des populations, par la lutte contre les pollutions chimiques et organiques des eaux de captage.

### Objectifs spécifiques

- Mettre en place des périmètres de protection des ouvrages de captage de l'eau contre la pollution (lacs, puits, forages);
- Mettre en place des dispositifs de confortation (couvercles, renforcement des abords, etc.) des puits ouverts contre la pollution;
- Appuyer les municipalités et les structures de gestion des infrastructures hydrauliques de captage de l'eau pour un suivi et/ou traitement de la qualité de l'eau et pour une gestion endogène durable.

### Activités prévues

- Réaliser une étude d'Avant Projet Détaillé (APD): identification, tests de qualité de l'eau, technique de mise en place des périmètres de protection et de confortation des puits ouverts, etc.;
- Mettre en place les périmètres de protection dans les sites identifiés et retenus;
- Mettre en place des dispositifs de consolidation et de traitement localisé des eaux des puits ouverts;
- Mettre en place en rapport avec les communes et les structures de gestion concernées, les mécanismes de suivi de la qualité et de protection des ouvrages;
- Renforcer par la sensibilisation aux changements climatiques et par la formation, les compétences des acteurs directement impliqués dans la gestion de la qualité de l'eau des ouvrages de captage.

### Résultats attendus à court terme

- Les sources de pollution sont éloignées des ouvrages de captage;
- Le mécanisme de gestion de la qualité bactériologique et chimique de l'eau des ouvrages est opérationnel;
- Les pratiques hygiéniques en matière d'usage de l'eau sont effectivement amorcées;
- Les maladies d'origine hydrique sont en recul très sensible.

### Effets à long terme

- La synergie d'actions entre particulièrement les ministères en charge de la santé, de l'environnement, et de l'eau pour la détection, le suivi et le traitement des sources de pollution à tout moment sont rodés;
- Les maladies d'origine hydrique sont éradiquées à au moins 80%;
- Les écosystèmes aquatique et intermédiaire des zones concernées sont protégés contre les pollutions chimiques en particulier.

### Moyens à mettre en oeuvre

Expertise nationale, appui technique et financier, équipements et appui institutionnel.

### 3. MISE EN OEUVRE

#### Arrangements institutionnels

- Maîtrise d'ouvrage délégué: MECV;
- Maîtrise d'oeuvre déléguée: Direction Générale des Ressources en Eau et Directions Régionales en charge de l'eau en étroite collaboration avec les



collectivités territoriales concernées, les structures techniques habilitées du Ministère en charge de l'environnement et du cadre de vie, de la santé;

- Autres ministères à impliquer: Ministère en charge de l'administration du territoire et de la décentralisation;
- ONG à impliquer: ONG agissant dans le domaine de l'environnement, de la santé et de l'eau.

#### Risques et obstacles

Les principaux risques portent sur:

- La non efficacité éventuelle de la synergie d'action entre les différents acteurs institutionnels d'une part et entre les différentes politiques sectorielles d'autre part dans la réalisation du projet et pour la gestion de l'après projet;
- La non acquisition du financement nécessaire.

#### 4. SUIVI ÉVALUATION

Le suivi-évaluation sera assuré par le SP/CONEDD, les DEP et les services techniques régionaux des ministères respectivement en charge de l'environnement, de l'eau et de la santé publique.

#### 5. RESSOURCES FINANCIÈRES

Désignation	Coût (en USD) et Programmation			
	An 1	An 2	An 3	Sous totaux
Etude APD, contrôle, suivi travaux	20 000	10 000	10 000	40 000
Mise en place périmètres de protection	15 000	15 000	10 000	40 000
Dispositif de consolidation et de protection physique des puits ouverts	50 000	50 000	50 000	150 000
Dispositif et mécanisme de suivi et de contrôle de la qualité de l'eau des ouvrages		15 000	15 000	30 000
Renforcement de capacité		15 000	15 000	30 000
Equipement		15 000	15 000	30 000
<b>Total général +10% arrondi</b>	<b>330 000 USD</b>			

Les régions du Sud-Ouest, des Cascades, du Mouhoun, des Hauts-Bassins et de l'Est du fait de la coton - culture et des niveaux relativement toujours bas des nappes phréatiques sont particulièrement les plus exposées à la pollution chimique (pesticides et engrais) et bactériologique.

# BURUNDI

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## BURUNDI NAPA PRIORITY PROJECT NO. 4 RAINWATER VALORISATION

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Translated from original French version

### RATIONALE

The economy of Burundi is based on rain-fed agriculture. Agriculture contributes for approximately 50% of the GDP, provides more than 90% of employment, and ensures 95% of the foodstuffs and more than 80% of foreign income.

The agricultural sector thus depends largely on the seasonal climate conditions, which are not controllable by the farmer. Climate seasonal variability generally consists of the late beginning or early end of the rainy season, or even an interruption of precipitation for several weeks in the middle of the season. These irregularities disorientate farmers in their usual agricultural calendar, surprise and destroy the crops in full vegetative phase, resulting in a catastrophic fall in agricultural outputs. Some areas of the country, especially in the North-East, are regularly struck by famine as a result of drought prevailing at periods of the year when it should normally rain.

However, Burundi has sufficient water resources if annual precipitation is considered. Even in the driest areas of the country, annual precipitation is approximately 800 - 1000 mm per annum. Water resources are not used in an optimal way to meet the needs of the country. Irrigation is still embryonic; marshes and lower valleys are not protected from floods, and the population always relies on direct precipitation for their crops.

To remedy these adverse impacts of climate variability and climate change on the population's agriculture and the economy in general, action should be undertaken to collect and store rainwater during the wet periods, and use it in a programme of arable land irrigation. This water would also be useful for livestock.

Installations on hills will make it possible to maintain sufficient moisture in the terrestrial environments during dry periods, and to protect marshes and lower valleys against floods during periods of heavy precipitation.

Moreover, considering the scarcity of water sources in this North-Eastern part of the country, it is most urgent to install photovoltaic storage systems. Technically speaking, the storage would be hydraulic in order to avoid the electrochemical storage that constitutes the most failing component of the photovoltaic systems. Considering the dispersion of rural settlements, this activity will have to be a community endeavour through a provision of modular installations with a system of distribution by fountains. In the region of Bugesera, water will need to be pumped from the lakes, thus involving the use of essential purification blocks.

The use of mechanical pumps in these regions could be considered, but experience in similar places shows that it is necessary to provide a lot of physical effort causing considerable fatigue to children and women.

In the absence of the adduction by gravity, the use of photovoltaic solar energy to pump drinking water constitutes the best indicated and adapted solution at the

environmental level compared to the pumping by diesel/gasoline motor-driven pumps that increase greenhouse gases emissions.

The activities should start in the regions the most affected by climate variability, i.e. in the area of Bugesera and more particularly in the provinces of Kirundo (Bugabira, Busoni, Kirundo, Ntega, Gitobe) and Muyinga (Bwambarangwe).

#### DESCRIPTION

##### **Global objective**

The global objective of the project is to improve food security and the public health of the target population through irrigated agricultural production and clean water conveyance.

##### **Specific objectives**

- Understand water harvesting and storage techniques;
- Understand hill irrigation techniques;
- Installation of pilot units of demonstration of these new techniques in the various communes of Bugesera;
- Avail drinking water in sufficient quantity for the benefit of the population living in the region of Bugesera.

##### **Activities**

The project will consist of achieving the following activities:

- Train A1 or A0 technicians by 3-month training courses abroad (in Africa) for specialisation in the rainwater harvesting /storage and hill irrigation techniques ;
- Train A2 technicians locally (2 per commune, 12 for Bugesera) in rainwater harvesting /storage and hill irrigation techniques;
- Set up at least one pilot installation of rainwater harvesting and hill irrigation in each of the 6 communes of Bugesera;
- Facilitate similar installations in targeted farmers/stockbreeders;
- Install one clean water conveyance system by photovoltaic pumping in the area of Bugesera.

##### **Outputs**

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

- Technicians trained and population made aware of the techniques of rainwater use for crop irrigation;
- Units of demonstration of these new techniques put in place;
- Farmers/ stockbreeders adopt the new techniques of agricultural production;
- Availability of drinking water in sufficient quantity;
- Improved human health.

###### **In the long run**

- Complementary agricultural production in the present /potential project areas, including periods of deficient precipitation;
- Protection of the lower valleys' soils against floods during period of heavy precipitation.

The ultimate output is food self-sufficiency and sustainable land management through better control of water needed for agricultural production

## IMPLEMENTATION

### **Institutional arrangements**

The project will be implemented in the Ministry for Agriculture and Livestock. The National Project Implementation Agency will be the Directorate-General of Mobilisation for Developmental Self-Promotion and Agricultural Extension Service via the DPAEs of Kirundo and Muyinga that will second high officials to the project. A collaborative framework will be established between the Department of Agricultural Engineering and Protection of Land Heritage and the Burundi Geographical Institute (IGEBU) under the Ministry for Land Management, Tourism and Environment (MINATTE), as well as the Directorate-General of Rural Hydraulics and Energies.

### **Risks and barriers**

The risk is for the trained technicians to leave for other jobs in Burundi or elsewhere as this often occurs.

The plots the most favourable for pilot installations probably belong to one or more private owners. This has an advantage if the owner agrees, but convincing them all could take some time.

### **Monitoring and evaluation**

A National Project Steering Committee will be composed of representatives from the Ministry for Agriculture, the Ministry for Land Management, Tourism and Environment, the Ministry for Energy and Mines, as well as representatives from the Ministry for Interior. Evaluation will be made on annual basis by a tripartite commission Government/ UNDP/ Donor representative(s).

### **Project duration**

4 years

### COST

*USD 1,000,000*

<b>Activities</b>	<b>Cost (USD)</b>
Train A1 or A0 technicians by some 3-month training courses abroad (in Africa) for specialisation in the rainwater harvesting /storage and hill irrigation techniques	100 000
Train A2 technicians locally (2 per commune, 12 for Bugesera) in rainwater harvesting / storage and hill irrigation techniques	50 000
Set up at least one pilot installation of rainwater harvesting and hill irrigation in each of the 6 communes of Bugesera	400 000
Facilitate similar installations in targeted farmers/stockbreeders	250 000
Install one clean water conveyance system by photovoltaic pumping in the area of Bugesera	200 000
<b>Total</b>	<b>1 000 000</b>

# BURUNDI

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## NAPA PRIORITY PROJECT NO. 10

### STABILISATION OF RIVER DYNAMICS OF RIVER COURSES OF THE MUMIRWA AND IMBO

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Translated from original French version

#### RATIONALE

The Imbo lowlands receive water from torrents in the Congo-Nile watershed and Mumirwa, which receives a lot of precipitation and slopes steeply. All these zones are very sensitive to lateral and vertical erosion along the axes of drainage, in particular during periods of strong precipitation. Very disastrous situations of erosion characterized by landslip and deposits of alluvia and colluviums in the lowlands are constantly observed and are likely to be accentuated following strong precipitation due to climate change.

The urban areas, in particular the town of Bujumbura that is crossed by 4 of these torrents, are particularly affected by this destroying type of erosion.

It is absolutely necessary to reduce or even remove this type of erosion to preserve both public and private infrastructure located in the vicinity of these axes of drainage.

The relatively weak slope in the plain of Imbo requires rainwater drainage and channeling of rivers and torrents in order to protect the infrastructure (urban bridges, roads, buildings and other equipment) and to ensure viable sanitation.

#### DESCRIPTION

##### **Objectives**

The global objective of this project is to protect the landscapes and the public and private infrastructure, located along the axes of drainage in Mumirwa and the Imbo lowlands, which are threatened by erosion during the periods of heavy precipitations. Ultimately, it is a question of ensuring the socio-economic wellbeing of the population concerned, through the development of a physical environment adapted to the changing climate conditions.

The specific objective of the project is the protection of the vital infrastructure of Bujumbura city located along the axes of the torrents by the stabilization of the river dynamics of river courses.

##### **Activities**

- Enhance meteorological and hydrological observation networks;
- Conduct a detailed study of the river dynamics of the river courses selected, in connection with the conditions of precipitations;
- Establishment of a town planning and development master plan of the lowlands taking into account the risks related to the inter-annual fluctuations of precipitations;
- Establish plans for the correction and stabilization of the rivers in question and the protection of the infrastructure in place;
- Carry out work of correction and stabilization on these rivers, starting with those that cross the town of Bujumbura;

- Work out a legislation on public safety in the case of disaster;
- Map out the zones at risk and propose land use standards in these zones or their basins slopes.

### Outputs

#### Short term outputs

- IGEBU data processing collection system and communication system improved;
- Maps of the zones at risk and the zones of priority intervention done;
- River courses stabilised;
- Attenuated erosion;
- Urban infrastructure protected.

#### In the long run

Preservation of landscapes and natural ecosystems of the Imbo - eroded or flooded lowlands, including those around Lake Tanganyika.

### IMPLEMENTATION

#### Institutional arrangements

The project will depend on the Ministry for Land Management, Tourism and Environment. The ministry will collaborate with the Public Works and Equipment Ministry that includes the urban development services. Implementation would be entrusted to private companies, under the supervision of top managing executives from the above-mentioned ministries.

#### Risks and barriers

- The high cost of the development works;
- Resistance by the owners or supposed owners of areas concerned.

#### Monitoring and evaluation

A Monitoring Committee will be set up in consultation between the donor and the ministry responsible. An external team will be responsible for project evaluation and audit.

#### Project duration

3 years

### COST

*Total USD 2,030,000*

Activities	Cost (USD)
Enhance meteorological and hydrological observation networks	80 000
Conduct a detailed study on river dynamics of the river courses selected, in connection with the conditions of precipitations	40 000
Establish a town planning and development master plan of the lowlands taking into account the risks related to inter-annual fluctuations of precipitations	30 000
Establish plans for the correction and the stabilization of the rivers in question and the protection of the infrastructure in place	20 000

Carry out work of correction and stabilizations on these rivers, starting with those that cross the town of Bujumbura	1 775 000
Work out a legislation on public safety in case of disaster	30 000
Map out the zones at risk and propose land use standards in these zones or the basin slopes	25 000
<b>Total</b>	<b>2 030 000</b>

# CAMBODIA

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## NAPA HIGH PRIORITY PROJECT 1C (NON-HEALTH) COMMUNITY AND HOUSEHOLD WATER SUPPLY IN COASTAL PROVINCES

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### SECTOR

Coastal Zone

### RATIONALE

There are few water sources available for household consumption and general use in the coastal communities of Kampot Province and Kep Municipality. The situation is compounded by the fact that both surface and underground waters are under the influence of seawater during the dry season and flood during the rainy season. The consumption of contaminated water is a cause of ill health, thus weakening people's capacity to prepare for flood and other climate disasters.

### DESCRIPTION

#### Objectives

- To provide safer water for rural communities in coastal areas;
- To reduce the incidence of water-related diseases.

#### Activities

- Construct community ponds for water storage;
- Create flood safe areas by raising ground using soil dug from ponds;
- Provide advice and guidance for rainwater harvesting; and
- Provide locally made water jars, and biological filters to households.

#### Short-term outputs

- Twenty community ponds with average storage capacity of 3,000m<sup>3</sup> constructed;
- 10,000 water filters and 10,000 water jars provided.

#### Potential long-term outcomes

- Access to safer water improved;
- Water-related diseases reduced;
- Poverty reduced.

#### Location

The project will be implemented in selected communities along the coastline: Kampot Province (2 coastal communities in Banteay Meas District, 5 communities in Kampong Trach District, 1 community in Dang Tong District and 1 in Praek Ampil Commune), Kep Municipality (11 coastal communities in Damnak Chang'aeur District), and Koh Kong Province (3 communities in each of Thma Bang, Botum Sakor and Kaoh Kong Districts).

#### Tme frame

The project time frame is 1 year, with fieldwork beginning in the dry season around January and ending in the beginning of the rainy season in May.



### IMPLEMENTATION

#### **Institutional arrangement**

MRD will implement the project in collaboration with the commune councils of the districts selected and concerned NGOs. The commune councils will assist in the selection of project locations and ensure appropriate maintenance of the ponds after the completion of the project.

#### **Risks and barriers**

Potential 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: number of ponds constructed, number of water filters and tanks provided and used, and incidence of water-related diseases.

### 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, 15 ponds have been constructed. Most of the projects were undertaken between 1985 and 2000.

Resource Development International and International Development Enterprises are two NGOs working on producing ceramic water filters for sale at low cost in Kandal and Kampong Chhnang provinces respectively. Other NGOs have produced slow sand filters for free distribution in Kratie, Stung Treng and other provinces in the northeast of the country.

### COST

<i>USD 1,000,000</i>
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# CAMBODIA

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## NAPA HIGH PRIORITY PROJECT 3D (NON-HEALTH) SAFER WATER SUPPLY FOR RURAL COMMUNITIES

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### SECTOR

Agriculture & Water Resources

### RATIONALE

Sufficient supply of safer water remains critical for rural Cambodians, which would enable them to better adapt to changing climate conditions. Approximately 30 percent of the rural population have access to safe water supply for domestic use, while the remaining experiences insufficient supply of safe water leading to water-related diseases. The problem has been aggravated by the prolonged droughts that have occurred more frequently in recent years.

### DESCRIPTION

#### Objectives

- To provide safe water in sufficient quantities for rural communities;
- To reduce the risk of contracting water-related diseases.

#### Activities

- Construct wells and ponds;
- Establish water user committees;
- Train community members in the maintenance and operation of wells and ponds;
- Provide locally-made water filters for household use.

#### Short-term outputs

500 wells and 100 ponds constructed; and  
10,000 locally-made water filters provided.

#### Potential long-term outcomes

- Access to safe water improved;
- Water-related diseases reduced;
- Poverty reduced.

#### Location

The project will be implemented in the following provinces: Battambang (Moung Ruessei District), Kampong Cham (Kang Meas, Srei Santhor, Memot and Stueng Trang Districts), Kampong Speu (Aoral and Phnum Sruoch Districts), Kampong Thom (Prasat Sambour and Kampong Svay Districts), Kandal (Kien Svay District), Kratie (Preaek Prasab, Sambour, Kracheh and Chhloung Districts), Prey Veng (Me Sang, Ba Phnum, Kamchay Mear and Kampong Trabaek Districts), Ratanak Kiri (Lumphat District), and Takeo (Tram Kak, Kaoh Andaet and Borei Cholsar Districts).

#### Time frame

3 years.

### IMPLEMENTATION

#### **Institutional arrangement**

MRD will coordinate the project and MRD Provincial Departments and concerned NGOs will implement it in collaboration with MoH and Commune Councils of the selected districts.

#### **Risks and barriers**

Potential land use conflict, weak social capital of local communities, limited data on groundwater resources and local hydrology.

#### **Evaluation and monitoring**

The following indicators will be used: number of wells and ponds constructed, number of water filters provided and used, incidence of water-related diseases reduced.

### RELATED DEVELOPMENTS

The construction of wells and ponds in selected areas has been carried by CONCERN, CRCD, FAO, UNICEF, WFP, etc. Provisions of household water filters designed by International Development Enterprises have been undertaken by a number of organizations in the north-eastern provinces and, to a lesser extent in Pursat and Kampong Chhnang Provinces.

### COST

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

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## NAPA HIGH PRIORITY PROJECT 4A (NON-HEALTH) DEVELOPMENT AND IMPROVEMENT OF COMMUNITY IRRIGATION SYSTEMS

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### SECTOR

Agriculture and Water Resources

### RATIONALE

Cambodia's agriculture is mainly based on rain-fed rice and mixed crops. There is evidence of an increase in the intensity and frequency of extreme weather events, including floods and droughts in Asia throughout the 20th century (IPCC, 2001). Cambodia has experienced increased rainfall in the wet season and prolonged drought in the dry season. Only about 19.5 % (approximately 400,000 ha) of cultivated land in Cambodia benefits from irrigation.

### DESCRIPTION

#### Objectives

- To provide sufficient water for rice farming;
- To reduce the risk of crop failures from water shortage; and
- To enhance food security and assist in eliminating poverty among rural people.

#### Activities

- Rehabilitate existing community irrigation schemes;
- Construct new community irrigation systems (including water reservoirs);
- Establish water user associations;
- Train community members on the maintenance and operation of irrigation systems.

#### Short-term outputs

- 15 community irrigation systems constructed;
- 15 existing community irrigation systems rehabilitated;
- Sufficient water supplied for rice farming in the project areas.

#### Potential long-term outcomes

- Agricultural productivity increased;
- Food security for rural people ensured.

#### Location

The project will be implemented in the following provinces: Banteay Meanchey (Svay Chek District), Battambang (Moung Ruessei and Koas Krala Districts), Kampong Cham (Kang Meas and Batheay Districts), Kampong Chhnang (Baribour and Kampong Tralach Districts), Kampong Speu (Samraong Tong and Chbar Mon Districts), Kampong Thom (Stueng Saen District), Kampot (Chum Kiri District), Kandal (Kandal Stueng, Khsach Kandal, Ponhea Lueu, Angk Snuol and Kaoh Thum Districts), Kratie (Kracheh and Chhloung Districts), Prey Veng (Sithor Kandal, Peam Chor, Kampong Trabaek, Preah Sdach and Peam Ro Districts), Pursat (Bakan,

Sampov Meas, and Phnum Kravanh Districts), Ratanak Kiri (Lumphat District), Siem Reap (Kralanh District), Svay Rieng (Svay Chrum, Romeas Haek, Rumduol and Svay Teab Districts), and Takeo (Tram Kak District).

**Time frame**

3 years.

**IMPLEMENTATION**

**Institutional arrangement**

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

**Risks and barriers**

Potential land use conflict, weak social capital in local communities.

**Evaluation and monitoring**

The following indicators will be used: number of irrigation schemes rehabilitated/built, number of water user associations established and well functioning.

**RELATED DEVELOPMENTS**

A number of governmental and non-governmental organisations and other donors such as ADB, APS (Italian Government), the Japanese Government, etc., have built medium-scale irrigation schemes in several provinces, including Battambang, Kampong Cham, Kampong Speu, Kampong Thom, Prey Veng, and Svay Rieng.

**COST**

*USD 45,000,000*

# CAPE VERDE

## NAPA PRIORITY PROJECT 1

### MOBILIZATION AND INTEGRATED WATER RESOURCES MANAGEMENT

#### JUSTIFICATION

In the context of the studies on vulnerability and adaptation to the climatic change in Cape Verde, the water resources sector was identified as being the most vulnerable and, as a consequence, considered as one of most priorities in what concerns the sectors that must benefit of urgent and immediate measures of adaptation aiming at facing the negative impacts of climate alterations.

Effectively, Cape Verde is undergoing a considerable reduction of rainfall since the decade of the 70s in the past century. The annual average of precipitation is currently around 225 mm.

All rainfall projection scenarios up to 2020, made with an adjustment of percentages of plus or minus 10% and 20% starting in 1990, had indicated values that are inferior to the average during the period under consideration (373,3 mm). However, one can observe the existence of periods with annual values that are both superior and inferior to the normal.

Although the real causes of this phenomenon are yet to be determined, all scenarios in the sub-Saharan Africa sub-region indicate a reduction of the current average rainfall in the order of 20% and an increase of temperature in the order of 4°C up to 2100. Cape Verde being inserted in this sub-region will also be negatively affected by these alterations, which could become even more aggravated due to the insularity conditions.

Parallel to this reduction of rainfall, one observes the decrease of the length of the rainy season, the spatialtemporal variability is getting greater and greater and the torrential character of these confers negative impacts to a wide array of variables, namely:

- Poor agricultural production and the negative effects on food security;
- Over exploration of the water sources, drilled wells and wells, as well as the consequent degradation of water resources;
- The increase of rural exodus, exacerbating the inherent socio-economic problems;
- The generalized degradation of the living conditions of the populations and the increase of the poverty incidence index.

With exception of desalinized water, all water used in Cape Verde originates from underground sources which are fed by precipitations. However, the volume of surface water is in general considerably superior to the volume of underground waters. Effectively, some studies had indicated infiltration values that vary between 13% and 17%, against 20% and 51% for draining.

This way, the current problems facing the water resources sector impose the need for preventing that the increasing water scarcity constitutes a barrier to the desired socio-economic development. Besides the increasing search for forms of mobilizing new

resources, such as seawater desalinization, it is necessary to identify all possible means to ration use of water, with the objective of getting maximum benefits for the population.

In spite of innumerable initiatives (plans/projects/programmes) implemented in the last decade in matters related to mobilization and capture of water resources, evidence shows that the access and supply of water to families still remains deficient, mainly in rural areas.

Thus, the mobilization and integrated management of water resources project is one of most priority, allowing operationalization of a set of immediate and urgent adaptation measures, identified during the NAPA process.

#### DESCRIPTION

##### **Global Objective**

The global objective of this project is integrated within the context of the development objectives, as indicated in several key Cape Verde macro-policy instruments such as the Great Options of the Plan, the DECRP (Growth and Poverty Reduction Strategy Document), the Millennium Development Objectives (MDGs), and sectoral plans such as the 2004 -1014 National Environment Action Plan (PANA II) and the Agricultural Development Strategical Plan for the 2015 Horizon.

Effectively, the global objective of this project is to contribute to concretization of the development goals as indicated:

1. Contribute to the sustainable development on the basis of the integrated and participatory valorization of natural resources and on the local socio-economic sector.
2. Contribute to the improvement of living conditions of target populations, with improvement and amplification of the productive basis of agro-silvo-pastoral and maritime resources.

This global objective is, in a general way, valid for the other projects identified.

##### **Specific Objective**

The specific objectives of this project are reduction of the vulnerability of the water resources sector in face of the negative impacts of climate change and increased capacity for capture, provision and storage of surface waters.

#### COMPONENTS, RESULTS AND ACTIVITIES

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**COMPONENT 1: Reinforcement of stakeholder's capacities in matters of adaptation to the climate and variability changes under the systemic, organizational and individual point of view**

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##### **Result 1**

*The precise status of water resources in Cape Verde is known and a favourable environment to Integrated Water Resources Management (GIRH) is created;*

##### **Activities**

- Update of the water balance of Cape Verde;
- Elaboration of decentralized management plans on water production and distribution infrastructures;

- Training of stakeholders in GIRH techniques;
- Technical, material and organizational support from the institutions (central and municipal) and from the community base organizations for water resource management;
- Adoption of norms on water quality.

**COMPONENT 2: Investment, conservation and field protection activities**

**Result 2**

*The volume of water mobilized for domestic, agriculture, industry and tourism use is significantly increased.*

**Activities**

- Construction of small family size cisterns, communitarian cisterns and respective collection surfaces,
- reservoirs, capture, provision and water storage infrastructures, small dams or aqueducts, and promoting diffusion of localized and drip irrigation, particularly for fruit and vegetable crops;
- Promote installation of water harvest systems from clouds in high altitude zones;
- Construction of infrastructure for recharge of aquifers and retention in order to diminish the losses through underground draining in direction of the sea, such as underground filters;
- Replacement of the traditional water provision installations (open sky piping) for irrigation under closed conditions;
- Construction of residual water treatment infrastructure.

**COMPONENT 3: Research-action for improvement of the resistance of populations and ecosystems.**

**Result 3**

*The knowledge on the state of the water resources and the traditional practices of adaptation to the variations of the water cycle are better known and new techniques associated to the GIRH better are adopted.*

**Activities**

- To carry out a participatory survey on the relative knowledge of the state of the water resources in the aquifers sheets, supply sources and wells;
- To establish modelling maps and an information and monitoring system on water resources;
- To carry out participatory research on the knowledge of traditional practices of adaptation to the
- variations of the water cycle;
- To experiment new techniques of adaptation of GIRH in the field, in the perspective of replication on a wider scale.



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**COMPONENT 4: Mobilization, Information, Sensitization of the stakeholders on the risks associated to climate change and variability**

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**Result 4**

*The stakeholders are aware of the risks associated to the variations of the water cycle and know the urgency measures to be taken in case of need.*

**Activities**

- Preparation of a sensitization campaign for the populations on the eventual risks due to the modifications of the natural water cycle (storms, flooding, droughts, and others) and urgency measures to be taken in case of need;
- Support the participation of Cape Verde in the information exchange networks on issues of adaptation to the climate change and integrated water management;
- Creation of a multiple stakeholder platform, according to directives of the Global Water Partnership (GWP).

**PROJECT COST ESTIMATES**

<b>COMPONENTS</b>	<b>%</b>	<b>COST ESTIMATES (USD)</b>
1. Reinforcement of stakeholder's capacities in matters of adaptation to the climate and variability changes under the systemic, organizational and individual point of view	18%	2 462 000
2. Investment, conservation and field protection activities	57%	7 797 600
3. Research/action to improve resistance of the populations and ecosystems	14%	1 915 200
4. IEC of the stakeholders on the risks associated to the climate and variability changes	7%	957 600
5. Project management costs	4%	547 200
<b>TOTAL*</b>	<b>100%</b>	<b>13 680 000</b>

**Potential donors identified**

- Government of Cape Verde;
- Global Environment Facility (GEF);
- United Nations System in Cape Verde;
- Luxembourg Cooperation;
- Austrian Cooperation;
- Global Water Partnership.

# REPUBLIQUE CENTRAFRICAINE

## NAPA PRIORITY PROJECT 7

### AMÉNAGEMENT DES SYSTÈMES D'APPROVISIONNEMENT EN EAU POTABLE DANS LA LOCALITÉ DE IMO HORO

**Agent d'exécution:** PNUE/ FEM

**Pays où le Projet sera exécuté:** République Centrafricaine

**Admissibilité du pays:** La République Centrafricaine a ratifié la Convention cadre des Nations Unies sur les Changements Climatiques (CCNUCC), le **10 mars 1995**.

**Domaine d'intervention du FEM:** Changement Climatique

**Programme opérationnel/ Mesure à court terme:** Ecosystème forestier (PO3)

Liens du projet avec les priorités, plans d'action et programme nationaux: le projet est fondé sur les priorités du secteur forestier indiquées dans le Plan National d'Action pour l'Environnement (PNAE) et le Plan d'Action Nationale d'Adaptation (PANA) aux effets néfastes des Changements Climatiques en République Centrafricaine.

**Agent de liaison national pour les opérations du FEM et date d'agrément par le pays:** Point Focal Opérationnel du FEM

#### JUSTIFICATION

Imohoro qui est un village qui se trouve à 40km de la ville de Bangui mais qui a un problème d'eau potable accru. Il y a très longtemps les sources d'eaux étaient bien réparties naturellement, mais actuellement presque toutes ces sources ont disparu. Les quelques sources restantes, sont disputées entre les habitants et leurs bétails. Cette situation est accentuée par l'augmentation des prélèvements d'eau de façon accrue pour faire face aux besoins agricoles, pastoraux, et humains. Il nous faut des mesures d'adaptation pour cette population du fait que l'eau, composante essentielle de l'environnement, ne doit plus causer de nuisances, du fait de débits non contrôlés, du fait de sa seule présence entraînant la prolifération de vecteurs de maladies, ou du fait de sa mauvaise qualité. Maîtriser les écoulements superficiels. Les ressources en eau potables sont rares, il s'impose une mesure urgente pour s'adapter.

#### DESCRIPTION

##### **But**

Améliorer La qualité de vie de la population de IMO HORO à travers un aménagement des conditions d'approvisionnement en eau potable

##### **Objectifs spécifiques**

- Signer de contrat avec la société DISTIB'EAU qui utilise un procédé de traitement galvanique de l'eau, économique, sans produit chimique, ni sel, ni raccordement électrique, ni aimant et sans entretien. Favorable pour cette population vulnérable;
- Sauvegarder la qualité des eaux par des campagnes de sensibilisation sur les maux liés à l'hygiène sur l'eau et par la mise en place de périmètres de protection autour de point d'eau;
- Réduction des émissions de GES;
- Protection de la ressource aux phénomènes de pollution.

### Indicateurs

- La gestion des systèmes d'eau potable est assurée par les bénéficiaires eux-mêmes de manière durable;
- La population applique les notions d'hygiène relatives à l'environnement des points d'eau et à la consommation de l'eau traitée;
- Prendre des mesures préventives et curatives contre les pénuries d'eau et les pollutions.

### Résultats attendus

- Amélioration des conditions de vie des populations;
- Le taux d'émissions de GES est réduit;
- L'utilisation durable des points d'eau et la disponibilité de l'eau à moyen et long terme est assurée à travers l'encadrement organisationnel et technique, donc les bénéficiaires sont en mesure d'entretenir les systèmes d'eau;
- L'approvisionnement d'eau en qualité potable, appuyée par un changement dans la conscience et le comportement de la population sur les aspects d'hygiène, traitement d'eau et la protection de l'environnement des sources et captages, donc le savoir des groupes cibles sur l'importance de la désinfection de l'eau est renforcé;
- Mener des campagnes d'animation et de sensibilisation sur l'utilisation de l'eau.

### Indicateurs

- Elaborer et mettre en oeuvre des programmes d'éducation sanitaire pour la population, portant sur les dangers de l'eau non potable et d'un environnement insalubre.
- Un grand nombre de partenariats est mis en oeuvre dans ce projet pour cette communauté très vulnérable;
- Suivi de la qualité de l'eau en partenariat avec la population et les ONGs;
- Amélioration de la gestion de la ressource;

Mesures prévues à cet effet (y compris coûts en dollars de chaque activité): **USD 250. 000**

- Mettre en place un programme d'IEC au profit des populations sur l'hygiène du milieu, formation aux techniques de base de l'assainissement. 50.000 \$US
- Mettre en place un système d'approvisionnement en eau potable par Distrib'eau \$USD 200 000.

### Indicateurs

- Les programmes d'Information/Education/Communication (I.E.C), de même que les programmes de formation, devront être élaborés par des spécialistes et diffusés par tous moyens appropriés. Les agents d'hygiène et de santé, présents sur le terrain, auront un rôle déterminant à jouer pour la coordination des actions d'I.E.C, tandis que le concours des médias et des ONGs, congrégations religieuses, associations de femmes et autres, sera sollicité pour leur mise en oeuvre.
- L'amélioration de la connaissance de la ressource, l'économie dans son utilisation et sa surveillance;
- Des ateliers locaux seront organisés avant la fin de la 1re année. création de comités de gestion des villageois à la fin de la 1ère année.

**MISE EN OEUVRE**

**Durée:** 24 mois

**Renseignement:** sur l'institution présentant la fiche de projet

**Renseignement sur le promoteur du projet:** Direction Générale de l'Environnement de la République Centrafricaine.

**Renseignement sur l'agent d'exécution:** PNUE.

**Date de présentation initiale de la description du projet:** Mai 2008

**Renseignement à fournir par l'agent d'exécution**

Numéro d'identification du projet:

**Personne à contacter à l'agence d'exécution:** Point Focal National CCNUCC/RCA

**Lien du projet avec les programmes de l'agence d'exécution:** Programmes d'Action Nationaux d'Adaptation et Stratégies nationales en matière des changements climatiques.

**COÛT**

*Coût total : USD 250,000*

**FEM:** USD 250.000

**Cofinancement (USD):** A rechercher

# COMOROS

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NAPA PRIORITY PROJECT NO. 2

PROJECT SHEET NO. 4

INCREASE OF WATER SUPPLY

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## SECTOR OF INTERVENTION

Water resources

### RATIONALE

Climate variability has a negative influence on the quantity of water resources. Precipitation variations, season gaps and prolonged droughts provoke early water shortages, difficulties in cooking food and the deterioration of the hygiene conditions, particularly in the less watered areas. Moreover, high temperatures increase real evapotranspiration, thus reducing the rate of ground water recharge.

It is therefore imperative for the country to double its efforts in order to improve access to drinking water for the populations that are mostly exposed to the risks of water shortages.

### ZONES OF INTERVENTION

Bangoikouni, Pidjani-Mbadjini, Koimbani Oichili et Mbeni (Grand-comoro), Fomboni, Gnomachioi, Ndrondroni (Moheli), Chaweni, Mutsamudu, Ouani et Sima, Chandra (Anjouan)

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

National programme on access to drinking water and water improvement, MDG, PRGSP (Poverty Reduction and Growth Strategy Paper)

### RECIPIENTS

Rural populations from the most dried areas.

### DESCRIPTION

#### Objective

The ultimate objective of the project is to enable communities, from the most dried areas, to adapt to drought aggravated by the fluctuations of precipitations related to climate modifications.

The project aims, more specifically, at favouring the development of hydraulic in the villages, in order to face water shortages and reduce water-related diseases.

#### Activities

- Identification of the sources (surface or underground);
- Development of water harnessing, collection and storage infrastructures;
- Extension of the distribution networks;
- Simple pumping wells equipment (manual, solar, wind pumps);
- Public awareness on hygiene and reasonable water management.

**Inputs**

The implementation of the project will require the following inputs: water sources that can be exploited, pumping equipment, water mains, construction materials for the storage infrastructures, organisation and management facilities, resources, etc.

**Short term outputs**

The aim of the project is to increase the availability and access to water as well as to reduce water-related diseases.

**Long term outputs**

The project will contribute to communities capacity-building, in view of a reasonable management and preservation of the resource. The project could also enable to envisage irrigation in view of increasing agricultural production, thus contributing to food security.

**IMPLEMENTATION****Institutional arrangement**

The project will be carried out by a multisectoral pilot committee for each island under the supervision of the Island Minister of Environment, with the national coordination of the Union Minister in charge of Environment.

**Risks and barriers**

The limited technical ability of the actors, the level of commitment of the users, the ability to service the infrastructure, the possible delay in the mobilisation of resources, the lack of experience and the weak means of the newly set-up decentralised institutions in charge of supervising the project, could limit the success of the project.

**Follow-up and evaluation indicators**

- Water volume stored and available during the dry season;
- Water access rate;
- Cover rate;
- Reduction of the prevalence of water-related diseases;
- Degree of mobilisation of the communities around the development of small hydraulic works in the villages;
- Increase of the irrigated agricultural surface areas;
- Cost of the litre of water.

**COST**

<i>USD 95,000</i>
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# COMOROS

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**NAPA PRIORITY PROJECT NO. 3  
PROJECT SHEET NO. 5  
IMPROVEMENT OF WATER QUALITY**

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**SECTOR OF INTERVENTION**

Water resources

**RATIONALE**

Climate variability has a negative influence on the quality of water resources. Anjouan and Moheli are supplied mainly by river waters. The quality of the river waters has been altered by the scarcity of the resource, the overexploitation related to the increasing needs of the populations, the effects of erosion, etc.

Bacteriologic analyses made in Anjouan showed that 60% of the harnessing are contaminated at 100% and only 20% are not. This is the main cause of frequent cases of hepatitis and especially typhoid fever which has been prevailing on the island for several years and which is responsible for many deaths. In Grand-Comoro, the quality of the tank water is not good either. According to a survey on Skills, Attitudes and Practices (SAP) conducted in 1999, out of 1813 households, 29% have uncovered water tanks.

Also, the rise in the sea level increases the salinity of the underground water. Out of 44 reconnaissance wells spread out over the coastal zones of Grand-Comoro, only 24 wells have salinity below 3g/l.

It is therefore urgent to double the efforts to improve access to drinking water through the preservation of water quality and its treatment, in order to improve the health of the populations.

**ZONES OF INTERVENTION**

Adda, Salimani, Domoni, Ouani, Mutsamudu, Mirontsi (Anjouan) ; Wanani, Fomboni, Miringoni (Moheli) ; Wellah Mitsamiouli, Bangoi kouni, Mtsnagadjou, Oouroveni (Grand-Comoro)

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

National Programme on access to drinking water and water improvement, MDG, PRGSP (Poverty Reduction and Growth Strategy Paper)

**RECIPIENTS**

Rural and urban populations.

**DESCRIPTION**

**Objective**

The ultimate objective of the project is to enable communities to have access to drinking water in order to preserve health in a context of precipitation fluctuations and degradation of the quality of the resource, in relation with climate modifications.

**Activities**

- Setting-up of water treatment infrastructures;
- Training in water treatment;
- Setting-up of protection perimeters around the sources;
- Public awareness on water hygiene.

**Inputs**

- Exploitable water sources,
- Equipments and treatment products,
- Organization and management facilities,
- Resources
- etc.

**Short term outputs**

The aim of the project is to supply drinking water and reduce water-related diseases.

**Long term outputs**

The project will contribute to communities capacity-building, in view of the continuous treatment and preservation of water quality.

**IMPLEMENTATION****Institutional arrangement**

The project will be carried out by a multisectoral pilot committee for each island under the supervision of the Island Minister of Environment, with the national coordination of the Union Minister in charge of Environment.

**Risks and barriers**

The level of public awareness and commitment of the users, the ability to maintain the infrastructure and ensure the regular supply of treatment products, the possible delay in the mobilisation of financial resources, the lack of experience and the weak means of the newly-set up decentralised institutions in charge of supervising the project, could limit the success of the project.

**Follow-up and evaluation indicators**

- Cover rate in drinking water;
- The number of built filtration and decantation basins;
- Decrease of the prevalence of water-related diseases;
- Degree of mobilisation of the communities for the preservation of water quality.

**COST**

<i>USD 80,000</i>
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# DJIBOUTI

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**NAPA PRIORITY PROJECT NO. 3**  
**PROMOTION DES ACTIONS ADAPTÉES D'AMÉNAGEMENT ET DE**  
**GESTION DES EAUX DE SURFACE**

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## BUT DU PROJET

Amélioration de l'infiltration des eaux de ruissellement pour accroître la productivité des parcours et la recharge des nappes phréatiques pour réduire la vulnérabilité des zones cibles aux changements et variabilité climatiques.

## DESCRIPTION DE LA SITUATION ACTUELLE DES SITES DU PROJET

### **Environnement physique des zones du projet**

La principale saison des pluies de la zone du sud ouest (Gobaad) va de juillet à septembre. Le climat de type aride avec une pluviométrie moyenne annuelle de 176 mm répartie sur une vingtaine de jours.

La température oscille autour de 30°C. L'humidité relative moyenne mensuelle se situe entre 40 et 65% en janvier avec un ensoleillement intense et vents parfois violents. L'évaporation potentielle atteint 2 000 mm/an. Les sols sont de type limono sableux.

Le secteur de Gobaad est traversé par un grand oued qui porte le nom de la région et des petits affluents dont les bassins sont plus réduits que le premier. Le village d'As Eylal chef lieu de la zone est alimenté par un forage mais les eaux souterraines de la zone sont pour la plupart mal connues. A part quelques sources salées au Lac Abhé il n'y pas de cours d'eau permanent. Les exploitations agricoles et les éleveurs exploitent la nappe phréatique. Le niveau de cette nappe commence à baisser ces dernières années compromettant même l'activité agricole jadis prospère dans la zone.

### **La situation socioéconomique de la zone du projet**

La zone du projet est habitée par deux communautés d'éleveurs que sont les Afars et les Issas. Les terrasses de l'oued Gobaad dont la grande partie du bassin versant se trouve en Ethiopie abritent quelques 300 exploitations agricoles qui se sont développées depuis le début des années 80. La zone possède une des coopératives agricoles la mieux structurée du pays. Sur tout le reste du territoire de l'arrondissement d'As Eylal l'élevage extensif est pratiqué avec son lot de dégradation des terres de parcours autour des points d'eau, des villages due à la restriction de mobilité des troupeaux sédentarisés.

## ANALYSE ET JUSTIFICATION

La sécheresse récurrente associée à la pression anthropique (croit du bétail et de la population) a un impact négatif sur le milieu naturel. Le couvert végétal aide à maintenir et à améliorer la capacité d'infiltration du sol à travers ses racines et litière retient le ruissellement superficiel et lui laisse davantage de temps pour permettre à l'eau de s'infiltrer. Grâce à la réduction du ruissellement superficiel, les taux d'érosion sont sensiblement réduits.

Ce milieu fragilisé peut être soumis à l'érosion hydrique et éolienne qui a des conséquences nombreuses et importantes pour l'écologie et l'économie humaine car

elle enlève la couche superficielle et productive du sol, endommage les pistes et les exploitations agricoles par ravinement, et provoque une dégradation de l'environnement qui ne peut être enrayerée que moyennant de grands efforts.

Ces facteurs physique, climatique et anthropique associés entraînent une mauvaise infiltration de l'eau de ruissellement (non recharge de la nappe), réduction de la productivité des parcours naturels (faible productivité du bétail). Ce qui a pour conséquence une paupérisation des éleveurs et agriculteurs n'ayant pas des ressources alternatives.

Ce programme à travers les travaux simples de conservation des eaux et des sols et une gestion raisonnée des ressources naturelles a pour objet la restauration d'un équilibre afin d'améliorer le niveau de la population et réduire l'exode rural.

### DESCRIPTION

#### Objectifs et activités

- Réduire l'érosion hydrique;
- Améliorer l'approvisionnement en eau des éleveurs et leur bétail;
- Amélioration du disponible fourragère à travers aussi d'une gestion rationnelle.

#### Intrants

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

#### Résultats à court terme

- L'érosion hydrique est réduite grâce à des travaux de conservation des eaux et des sols;
- Les éleveurs sont formés aux techniques simples de maîtrise des eaux de ruissellement;
- L'offre fourragère des zones aménagées est améliorée;
- La disponibilité de l'eau est améliorée pour l'abreuvement du bétail et les éleveurs.

#### Résultats à long terme

- Ressources halieutiques conservées;
- Extensions des infrastructures et des constructions limitées.

### MISE EN OEUVRE

#### Arrangements institutionnels

Les communautés assureront la gestion du projet par l'intermédiaire de leurs groupements coopératifs existants ou à créer des sites pilotes. Les activités seront encadrées par les ministères et institutions compétents (Ministères chargés de l'Environnement et de l'Agriculture, Centre d'Etudes et de Recherches de Djibouti) en collaboration avec les autres autorités compétentes (Commissaires de la République, Conseils régionaux).

Le projet sera piloté par un comité présidé par le Ministère de l'Environnement et comprenant les départements techniques concernés. Au niveau local il y aura un Comité de gestion composé des services techniques et des Communautés locales. Le projet sera exécuté sur le terrain par des opérateurs privés.

### Risques et obstacles

Les risques sont limités et peuvent concerner le degré d'appropriation et de participation des éleveurs aux activités.

### Evaluation et suivi

Un comité de pilotage intersectoriel du projet composé des institutions nationales et des associations des éleveurs procédera au suivi et à l'évaluation du projet. Le coordinateur du projet fournira régulièrement des rapports au comité.

### Ressources financières

Ce projet est de type indépendant (*stand alone project*) car aucune action n'est envisagée par le pays dans un proche avenir pour changer la situation. Le coût additionnel couvre donc la totalité du budget de l'action proposée.

#### PLAN DE FINANCEMENT

*Total: 1 447 000*

	USD
Travaux de CES/DRS	120 000
Infrastructure d'approvisionnement en eau (énergies renouvelables)	1 180 000
Aménagement de périmètres fourragers et gestion	110 000
Sensibilisation	37 000
<b>Total</b>	<b>1 447 000</b>
<b>Ligne de base</b>	<b>0</b>
<b>GEF</b>	<b>1 447 000</b> <i>(1USD = 170 FD)</i>

# ERITREA

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## NAPA PRIORITY PROJECT 4 GROUNDWATER RECHARGE FOR IRRIGATION WELLS

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### PROJECT AREA

A decline in groundwater is already being experienced in most parts of the country and in particular in the more arid areas of the coastal plains and certain valleys in the highland such as Tsilma, Adi-Keih, Hagaz and Ala. In these areas, wells are drying up and groundwater supply for continuation of irrigation as well as for livestock and human uses has become critical. These areas are very vulnerable to climate variability, drought and climate change and the focus of this adaptation project.

### RATIONALE

Urban and rural communities, irrigated agriculture and industries who rely on ground water resources for their water supply are already suffering from the negative impact of climate variability in particular low and unreliable rainfall, short rainy season, extreme weather events such as drought and climate change. The wells are drying up and the population in some villages fetches water far away. Small holder irrigated agriculture from ground water is failing examples are like in Alla and Hagaz are depending on water trucking. Rural inhabitants are paying more than double the price they use to pay coastal areas groundwater sources are threatened with seawater intrusion. So far, no projects have been implemented whose main objective is to enhance ground water volumes as coping mechanizes strategies have not been effective. In Eritrea, about one million cubic meters of water flow out of the country as surface flow. If a substantial amount of this water is allowed to be stored in under ground aquifer as ground water, this will enable communities and livelihood resource to better adapt to the negative impact of climate changes. To cope with this problem and sustain the resource activities to enhance groundwater recharging will be required.

### DESCRIPTION

#### Objectives

1. To enhance ground water recharging.
2. To ensure easily accessible water supply for domestic and agricultural use.
3. To increase spring water supply and protect natural forest and wild animals from extinction.
4. To prevent coastal ground water supply from salt water intrusion.
5. To prevent salt water intrusion to coastal ground water supply.

#### Activities

1. Develop integrated watershed management programme
2. Construct an effective soil and water conservation structures for farm and non-farm lands
3. Establish ground water monitoring
4. Capacity building of \*farmer\* MOA and WRD

#### Short-term outputs

1. Water recharging structures are in place;

2. Community institutions for water use management established;
3. Water supply and demand control legislation present.

**Potential long-term Outcomes:**

1. Increased availability of good quality and quantity of ground water for urban and rural uses;
2. Increased availability of ground water for irrigation;
3. Quality and quantity of coastal water supply improved;
4. Improved wild life habitats through increased water supply availability;
5. Contribution to food security, health, nutrition, and poverty reduction;
6. Sustainable coping strategy to climate change;

**Table summarizing indicators to measure long-term outcomes:**

<b>Expected outputs/ Indicator</b>	<b>Potential long term outcomes</b>
Wild life habitats and natural forests maintained. Community based IWPP establishing and functioning effectively. Sustainable ground water resource.	Good quality and quantity of ground water available to urban and rural communities.
Ground water source improved and sustained. Well-maintained and effective terraces constructed, gullies stabilized erosion and stream and river flow reduced substantially.	Make irrigated agriculture sustainable
Monthly report produced to decision makers well informed. Ground water use regulated accordingly	Ground Water Resources are better understood and well controlled. In addition efficiently managed and utilized.
The Technique of ground water recharging well understood and practiced. Capacity of MOA extension agents improved in constructing effective soil and water conservation structures Capacity of farmers improved in construction and maintaining soil and water conservation structures	Soil moisture increased and land productivity increased; adequate spring water is available for wild animals.

**IMPLEMENTATION**

The national implementing agencies would be the MoA and the WRD. The MoA is the most appropriate body to implement this project. This is because it has a widely spread network of extension agents who are quite experienced in working with farmers. The farmers are the implementing bodies of most of the activities of the project. The WRD will be involved in monitoring ground water resource and in preparing appropriate legislation on management and utilization of groundwater resource.

A project management unit will be established to follow the day-to-day activity of the project. Project steering committees will be formed at national and local level and will consist of executive level officials of respective ministries and community representatives and private stakeholders like NGOs. The duty of the steering committees is to make sure that the project is financially and technically implemented according to an agreed project document.

**Risks and Barriers**

Key risks are associated with shortage of budget to implement this project, lack of existing national legislation on the proper utilization of ground water delays, and the physical structures constructed to enhance ground water recharging are not properly maintained and managed.

### Monitoring and Evaluation

The project will be monitored and evaluated regularly every six months. It will also be evaluated by external consultants at the end of its life relative to the matrix shown below.

#### Project duration

3 years starting from the time funds made available.

#### COST

*USD 7,252,000*

The table below summarizes the costs associated with the implementation of this adaptation project.

<b>Project Component</b>	<b>Cost (USD)</b>
Develop integrated watershed management programme	2 000
Construct effective soil & water conservation structures for farm and non-farm lands (6,000 ha)	5 700 000
Establish ground water monitoring programme	1 500 000
Capacity building of *farmer* MOA and WRD	50 000
<b>TOTAL</b>	<b>7 252 000</b>

# ETHIOPIA

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## NAPA PRIORITY PROJECT 3

### DEVELOPMENT OF SMALL SCALE IRRIGATION AND WATER HARVESTING SCHEMES IN ARID, SEMI-ARID, AND DRY SUB-HUMID AREAS OF ETHIOPIA

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#### RATIONALE/JUSTIFICATION

Dependency on seasonal rains has not only kept crop production and productivity very low but also made agriculture a risky business. Arid, semi-arid, and dry sub-humid areas of the country experience very high seasonal and inter annual rainfall variability affecting crop production and food security. Ethiopia is rich in its water resources and sometimes called the water tower of East Africa. However, the country is constrained; among others by lack of capacity to sustain and ably utilize its water resources.

The total irrigable land under irrigation currently averages 4 to 5 percent. Large and Small scale irrigation development is mentioned as one of the priorities of NAP and the Initial National Communication Report for UNFCCC has also suggested as one of the climate change adaptation options for the agriculture sector. Water harvesting could be a valuable tool in increasing crop production, supplying water for humans and livestock.

#### DESCRIPTION

##### Objectives

- To increase water accessibility for agricultural production and enhance food security as well as to minimize impacts of drought hazards;
- Enhance socio-economic growth and alleviate poverty;
- To increase domestic water supply and livestock through water harvesting;
- To develop arable production with runoff farming/ rain water harvesting;
- To rehabilitate existing traditional irrigation and improve water application practices;
- To increase capacity of farmers and key actors to utilize water for agricultural production.

##### Activities

- Assessment and inventory of existing situation;
- Study, design and implementation;
- Identification of suitable sites for water harvesting, small scale irrigation dams and boreholes;
- Construction/development of dams, boreholes and ponds;
- Develop improved field canals and on-farm works;
- Prepare land for irrigation;
- Develop river diversion schemes using gravity or pump supply for small scale irrigation schemes;
- Organization of workshops for training of communities and professionals in water management

**Short-term outputs**

- Small scale irrigation dams and boreholes developed at selected sites;
- Increased irrigated land (Development of 30,000 hectares of small scale irrigation scheme) ;
- Increased agricultural production through better productivity;
- Increased capacity of communities and professionals in small scale irrigation management.

**Potential long-term outcomes**

Improved food and energy security, water supply and economic development

**IMPLEMENTATION****Institutional arrangement**

Ministry of Agriculture and Rural development will lead the coordination of the project. Ministry of Water resources, Bureau of Agriculture and Rural development, Water Users Associations, farmers and private investors are the main stakeholders

**Risks and barriers**

Lack of finance, lack of technical capacity, unavailability of suitable sites

**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 30 million*

*Project design: USD 500,000*



# GAMBIA

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## NAPA PRIORITY PROJECT 2 IMPROVEMENT OF FRESH WATER AVAILABILITY

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**Sector:** Water Resources  
**Project Area:** All regions  
**Beneficiaries:** Rural communities with inadequate and unsafe drinking water supply

### RATIONALE

Adverse climate change manifests itself in water resources in terms of too little, too much, and/or poor temporal distribution of rainfall. Shortfalls in aquifer recharge and base flow in particular are expected to affect water availability for domestic and agricultural uses. Water shortage in these sectors risks increasing poverty, and downgrading living conditions of rural communities.

### DESCRIPTION

#### Objectives

The overall objective of the project is to ensure adequate supply of fresh water and the reduction of the negative impacts of natural disasters.

#### Specific objectives

- Improving water availability in the surface and underground, in quantity and quality, suitable for agriculture, industrial and domestic needs;
- Improving the water supply infrastructure;
- Reducing drought impacts on domestic water supply and uses in agriculture.

#### Components/Activities

- Construction of water supply/control infrastructure;
- Development and adoption of appropriate policies.

#### Inputs

- Construction materials (including those locally available) for civil works;
- Labour (both skilled and unskilled);
- Specialised equipment and services (for the implementation of the project).

#### Short Term outputs

- Water harvesting, flow regulation and improved drainage systems;
- Water supply infrastructure development;
- Erosion control;
- Drought relief.

#### Potential long term outcomes

- Greater water security for communities;
- Increased protection of infrastructure to extreme climate events.

## IMPLEMENTATION

### Institutional arrangements

The Department of Water Resources will be the lead implementation agency with collaboration from the offices of the regional Governors, Agriculture and Community Development, together with the NAPA Project Steering Committee. The Department of State for Fisheries and Water Resources will be responsible for the general oversight of this intervention.

### Risks and barriers

- Inflation which can affect project costs if implementation is delayed;
- Difficulty to prepare adequately for rare extreme climate events;
- Multiplicity of stakeholders and the inability of implementing agencies to work in harmony;
- Implementing agencies may lack the capacity to identify and implement interventions effectively;
- Delays in implementation due to bureaucratic issues or lack financing.

### Monitoring and Evaluation

The Project Steering Committee, with its Secretariat at DWR will be responsible for the preparation of reports that will be submitted to the authorities and the NAPA Steering Committee. Mid-way into the project life, an independent consultant would evaluate project achievements and advise on improvements needed.

### Duration

18 months

### COST

*Estimated at USD 910,000*

ACTIVITY	COST (USD)
Reconnaissance survey team to assess physical and social conditions	26 000
Engineering design and detail soil surveys	52 000
Procurement of small hand tools as specified in the bill of quantities	18 000
Hire of tractor complete with disc harrow and trailer as specified in the bill of quantities	32 000
Construction of dikes, spillways, Upland soil conservation structures i.e.; contour and diversion bunds, Irish crossings, gully plugs, road ramps, etc	600 000
Monitoring and evaluation and continuous site supervision of all construction works	52 000
Procurement and delivery of agricultural inputs, i.e.; fertilizers, rice seeds for newly created ecologies due to the dikes, and lime for the treatment of areas with low pH	92 000
Agronomic follow-up to advise and supervise the routine crop husbandry, and supervise vegetative measures of improved drainage	18 000
Provision of modern equipment to DWR for continuous comprehensive data collection	20 000
<b>TOTAL</b>	<b>910 000</b>

# GUINEA BISSAU

## NAPA PRIORITY PROJECT 2

### RURAL ZONES SANITATION AND WATER-SUPPLY IMPROVEMENT PROJECT

**Location:** Southern Province (Bolama, Quinará and Tombali regions) Eastern Province (Bafatá and Gabú regions)

#### JUSTIFICATION

Potable water supply and sanitation are domains that affect populations' quality of life and public health. There is a need to increase the supply of potable water and sanitation services in villages in order to decrease the risk of waterborne diseases that are, in general, much frequent in the rural world. It should be recalled that the latest cholera epidemic, in 2005, registered about 25,000 cases and 400 fatalities (National Human Development Report, UNDP), due to bad sanitation conditions.

#### DESCRIPTION

##### Global objective

To improve access to quality water and reduce the risk of contraction of waterborne and infectious diseases.

##### Specific objectives

- To improve rates of access to quality water;
- To eliminate conditions that contribute to the appearance of cholera outbreaks and other diseases.

##### Components

- Sensitisation;
- Construction of latrines and environmental sanitation;
- Construction of improved wells and boreholes.

##### Expected results

- 60 % of population have access to potable water;
- Non-appearance of cholera epidemics and other diseases related to water consumption and sanitation conditions.

##### Beneficiaries

Communities and schools

#### IMPLEMENTATION

##### Institutional Implementation Framework

The Directorate General of Water Resources will implement the "Construction of wells" component and components concerning sensitisation and the construction of latrines will be placed under the Ministry of Public Health, which will benefit from support of some NGOs.

**Monitoring and Evaluation**

Components' supervising agencies and the donor, to whom the project management will be accountable and will submit reports for appraisal and approval, will ensure the monitoring of this project's activities.

**Risks and Barriers**

The main risk factors may arise from political instability and the mental attitude on the part of populations. Therefore, special attention ought to be paid to populations' sensitisation.

**Duration**

2 years

**COST**

*USD 1,000,000*

# GUINEA BISSAU

## NAPA PRIORITY PROJECT 7

### PROJECT PROMOTION OF SMALL-SCALE IRRIGATION SCHEMES IN GEBAL AND CORUBAL RIVERS' PROJECT

**Location:** Bafatá, Gabú and Tombali regions.

#### JUSTIFICATION

Guinean agriculture remains predominantly dependent on rainfall, which does not allow high yields in agricultural production. This situation is compounded by the influence of climate factors namely in years where there are long time intervals without rain. In the Gabu region, Pitche and Pirada suffer from seed losses and populations are forced to sow again their seeds; production shortages losses and sudden rain stoppages do not allow cultures to complete their vegetative growing cycle.

Yet, there are considerable potentialities and actual water resources, particularly in Corubal River. This opportunity is far from being tapped. The use of water resources and the optimisation of the use of lands in Geba and Corubal riverbanks for irrigation would be an alternative in the search for solutions to diminish the risk of effects of low rainfall and water shortage for agriculture. Irrigated agriculture allows the employment of modern control and management techniques, leading to high production yields.

#### DESCRIPTION

##### **Global objective**

Increase in food security.

##### **Specific objectives**

To increase agricultural production through the employment of efficient techniques for water control and management.

##### **Components**

- Technical studies
- Hydro-agricultural execution
- Beneficiaries' training and fitting.

##### **Expected results**

- Potential sites for agricultural development identified and surveyed.
- Summarised ante-project files prepared in search for funding to enable projects' expansion.
- Hydro-agricultural and development works in a perimeter of approximately 100 hectares per year.

##### **Beneficiaries**

Farmers' associations, rural communities, private sector.

#### IMPLEMENTATION

##### **Institutional Implementation Framework**

Ministry of Agriculture and Rural Development, DGA, DSER.

**Monitoring and Evaluation**

Supervising entity (MDRA), Directorate General of Environment, CAIA, NGOs, farmers' organisations and partners.

**Risks and Barriers**

Conflicts may arise on land tenure, cattle transhumance and other aspects that the project needs to clarify. Steps will have to be taken at the outset to overcome existing risks.

**Duration**

3 years

**COST**

*USD 800,000*

# HAÏTI

## NAPA PRIORITY PROJECT 013

### CONSTRUCTION DE CITERNES FAMILIALES ET COMMUNAUTAIRES DANS LE DÉPARTEMENT DE LA GRAND-ANSE

**Localisation:** Montagnac, Fond-Rouge (Jérémie), Lopineau (Roseau) et Jean-Bellune (Pestel)

**Secteur:** Ressources en eau

**Option:** Préservation et Conservation des Ressources en eau ([Option 5](#))

**Durée:** 2 ans

#### JUSTIFICATION

La pénurie d'eau reste le besoin le plus déterminant des communautés de Montagnac, Fond-Rouge, Lopineau et Jean-Bellune. De par leur position topographique, ces localités, n'ont pas pu bénéficier de points de résurgence. Les changements climatiques ont amplifié considérablement la disponibilité en eau pour ces populations. Les modifications dans la fréquence des précipitations sont très visibles. Pire encore, dans cette zone, il n'est pas rare d'observer plus de 7 mois de sécheresse dans une année et la majorité de la population n'a pas de moyen de collecte d'eau de pluie de grande capacité. Les structures de stockage sont ou inexistantes ou inadéquates. Les femmes et les enfants sont donc obligés de parcourir des kilomètres pendant plusieurs heures à la recherche d'un point d'eau où ils doivent en plus se battre pour se procurer le liquide précieux, compte tenu du nombre élevé de localités qui s'y desservent. De plus, cette eau est parfois de qualité douteuse et nuit à la santé des communautés. Des actions auraient déjà été entreprises par des institutions d'aide au développement en vue d'atténuer le problème en construisant certaines citernes familiales en appui à la production maraîchère et à l'arboriculture fruitière. Cependant, les quelques citernes construites ne parviennent pas à combler les besoins de la population. La construction de citernes de grande capacité selon une approche communautaire, dispersées dans un plus grand nombre de localités serait un moyen d'aider les communautés à faire face au problème de pénurie d'eau auquel elles sont confrontées.

#### DESCRIPTION

##### Objectifs

- Permettre aux familles des différentes communautés de se procurer de l'eau durant la période de sécheresse;
- Éviter les situations de tension sociale, générée par la crise de l'eau;
- Soulager les femmes dans leurs tâches domestiques en leur fournissant une source d'eau de proximité.

##### Activités

- Conscientisation les populations sur la nécessité de la gestion de l'eau;
- Formation sur le traitement de l'eau en vue de l'amélioration de sa qualité;
- Recrutement d'ouvriers qualifiés;
- Approvisionnement du chantier;
- Exécution des travaux.

**Intrants**

- Matériaux de construction (magasin);
- Matériaux de construction (ressources locales);
- Ressources humaines;
- Activités de formation;
- Participation locale.

**Extrants à court terme**

- Construction de 250 citernes de 15 m<sup>3</sup> de capacité à raison d'une citerne pour chaque 3 familles;
- Les besoins en eau de 1150 familles sont satisfaits;
- La population est sensibilisée sur la gestion conservatoire de l'eau et sur le processus du maintien de sa qualité.

**Résultats potentiels à long terme**

- Contrôle de certains germes de maladies;
- Disposition de l'eau pour une longue période de l'année;
- Développement de l'esprit de solidarité au sein de la population dans la gestion de bien commun;
- Développement de petites activités agricoles, notamment les cultures maraîchères entreprises par des femmes durant la période sèche;
- Amélioration de la sécurité alimentaire.

**MISE EN OEUVRE****Risques et obstacles**

Problème dans l'emplacement des citernes. Le choix des sites peut provoquer au départ de vives tensions au sein des 3 familles qui seront les bénéficiaires de la citerne. Il va falloir dans ce cas donner la priorité aux maisons à capacité de collecte importante.

**Ressources financières**

Le coût prévisionnel du projet est de:

*USD 828,955*

	<b>Cash (USD)</b>	<b>Nature (USD)</b>
1- Coût Total Projet	828 955	
2- GEF	528 955	
3- Cofinancement / Partenaires potentiels	225 000	
Gvt. Haïtien / MDE		25 000
Fonds Assistance Économique et Social		
Participation communautaire		50 000
ONG local		



# HAÏTI

## NAPA PRIORITY PROJECT 014

### RÉDUCTION DE LA VULNÉRABILITÉ DES RESSOURCES EN EAU PAR LA RÉHABILITATION DE VINGT CINQ POINTS D'EAU DANS LES QUATRE COMMUNES DU BAS NORD-OUEST

**Localisation:** Jean-Rabel, Baie de Henne, Bombardopolis, Môle Saint-Nicolas

**Secteur:** Agriculture et Eau Potable

**Option:** Préservation et conservation de l'eau (option 5)

**Durée:** 2 ans

#### JUSTIFICATION

Le problème commun et criant aux 4 municipalités du Bas Nord-Ouest reste le manque d'eau chronique. La population est obligée de parcourir des kilomètres à la recherche de l'eau. Les quelques ouvrages hydrauliques repérés ont été construits il y a des dizaines d'années. Cependant, depuis leur construction, aucun travail d'aménagement n'a été fait. Ces captages sont en train de péricliter. Vu leur état lamentable, ils méritent d'être considérés avec attention d'autant plus que l'eau des captages sert non seulement d'aliment de boisson aux communautés, mais aussi est utilisée dans la réalisation de certaines tâches quotidiennes et dans la mise en valeur de certains périmètres agricoles, dégradés par la sécheresse. Il importe donc non seulement de les améliorer mais encore d'en agrandir la capacité ou d'en construire de nouveaux en vue de la satisfaction d'une demande sans cesse croissante.

#### DESCRIPTION

##### Objectifs

- Refaire le captage, la mini adduction et la fontaine de 25 sources sur l'aire du Bas Nord-Ouest;
- Satisfaire les besoins en eau potable et à usage domestique des agglomérations habitant les zones cibles;
- Former des équipes pour la gestion des captages et la qualité de l'eau.

##### Activités

- Rencontre avec les responsables locaux, les organisations communautaires et les comités chargés de la gestion des captages;
- Formation et sensibilisation sur les techniques de traitement de l'eau;
- Constitution ou recomposition des comités de gestion des captages;
- Exécution des travaux.

##### Intrants

- Ressources humaines;
- Équipement, matériel et fournitures;
- Participation locale;
- Formation et sensibilisation;
- Matériaux de construction (magasin et ressources locales).

**Extrants à court terme**

- Constitution de 25 comités dont les membres habitent à proximité des lieux de captage;
- Formation des membres de ces comités;
- 13 captages sont rétablis à Jean-Rabel et à Baie de Henne;
- 5 captages sont réhabilités au Môle Saint-Nicolas;
- 7 captages sont refaits à Bombardopolis;
- 2,500 familles environ sont satisfaites en eau pour combler leurs besoins quotidiens;
- De petits périmètres agricoles situés proche des fontaines de distributions sont irrigués.

**Résultats potentiels à long terme**

- Éradication de certaines maladies liées à la consommation d'eau de mauvaise qualité;
- Amélioration de la production agricole et de la sécurité alimentaire;
- Développement de l'esprit de solidarité au sein de la population dans la gestion de bien commun;
- Développement de petites activités agricoles, notamment les cultures maraîchères entreprises par des femmes durant la période sèche;
- Amélioration des revenus des familles.

**MISE EN OEUVRE****Risques et obstacles**

- le choix des sites pour l'emplacement des fontaines/réservoirs de distribution d'eau;
- Non implication des autorités locales et des communautés de base;
- Troubles politiques.

**RESSOURCES FINANCIÈRES**

Les ressources prévisionnelles du projet sont évaluées à:

*USD 220,932*

	<b>Cash (USD)</b>	<b>Nature (USD)</b>
1- Coût Total Projet	220 932	
2- GEF	130 532	
3- Cofinancement / Partenaires potentiels	75 000	
Gvt. Haïtien / MDE/PIP		10 400
Fonds Assistance Économique et Social		
Participation communautaire		5 000

# KIRIBATI

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NAPA PRIORITY PROJECT =1

KIRIBATI NAPA SECTION 6.2.1

WATER RESOURCE ADAPTATION PROJECT

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## RATIONALE

Water resources on coral atolls are from ground water lenses. These lenses are extremely fragile and in many areas very limited in magnitude. Water lenses are also primary long term water storage facility for many people. The quality of the lens is dependent on rainfall and the width of the land. From this, it is clearly evident that water resources in Kiribati would be threatened by climate change involving more frequent (shorter with severer impacts) or longer duration droughts and coastal erosion.

Climate change, in the form of more frequent and higher level storm surges also threatens the water resources by over-topping the lenses with sea water. This causes the lens to be contaminated by saline intrusion from the surface. The time needed for a given lens to return to normal is dependent on rainfall, but recovery may require months or even years, completely disrupting social and economic patterns in villages or islands.

Additional to climate related risks to the lenses, risks from domestic sanitation practices can be quite significant. On the other hand, landowners of the lands at which water galleries are maintained to supply urban Tarawa people believe that water withdrawal from the lenses make coconut trees and pandanus trees less healthy and productive.

Communities therefore need to actively assess the status of their water resources, improve and protect them, and increase their quantity and storage.

## DESCRIPTION

### Objectives

1. To maintain and conserve available good ground water lenses;
2. To gain users confidence in the reliability of the distribution system and promote their willingness to pay, based on consumed quantity;
3. To increase water storage and water resources to meet current demands and at times of serious droughts.
4. To manage risks to water resources throughout the atolls. This will be achieved through risk assessments and in designing and implementing responses, including sustainable community-based monitoring system.
5. To assess impacts of urban water supplies on other natural resources, systems and subsistence activities.

### Activities

“Demand” pricing system will enable purchase of equipment and the setting up of a system for payment of water based on metered consumption. Improved maintenance of existing water supply system will involve routine and predictable procurement of parts and fittings, as well as continuous repairs. The monitoring of water resources on Tarawa will be expanded, and the monitoring of water resources on outer islands will

start on selected islands and wells. Local communities will be involved in monitoring ground water lenses with the aim to establish and start sustainable community based monitoring system. Awareness raising of the communities about the states of water lenses in their localities, and about the vulnerability of the lenses to environmental risks and domestic sanitation practices are important preconditions for a sustainable community-based monitoring system. Travel costs will be covered. Effects of drought on the water supply operations will be monitored and plans will be developed to provide alternative sources, including desalination.

#### Outputs

- PUB to have equipment to allow them to charge water on user-consumption basis;
- PUB to adopt a maintenance program, and to upgrade distribution of water to meet requirements of water charge on user-consumption basis;
- WEU to monitor wells on outer islands, and untapped water resources to form components of island vulnerability profiles;
- WEU to have feasible plans and implementation requirements for managing drought risks;
- Communities are better informed about the states of their water resources and risks;
- Communities participation in the monitoring of water resources;
- Impacts of urban water supplies on other natural resources, systems and subsistence activities.

#### COST

*AUD 3,168,405 (+10% contingency cost)*

<b>Indicative costs (AUD)</b>	<b>Local annual budget (AUD)</b>	<b>Total NAPA Costs Over 3 yrs</b>	<b>Responsible Ministry</b>
2 174 500	993 905	3 168 405	MPWU

# KIRIBATI

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NAPA PRIORITY PROJECT =1  
KIRIBATI NAPA SECTION 6.2.2  
SIMPLE WELL IMPROVEMENT

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## RATIONALE

Storm surges cause flooding to surrounding areas of wells that are located close to the shoreline. Heavy rainfall creates runoff flowing into unprotected wells. In addition, regular drawing of water from such wells by means of a container attached to a strong string whilst one stands at the edge of the well creates muddy and wet ground around the wells. Water from these wet grounds visibly drips into the wells. There are many such wells within the villages. Water borne diseases are a concern of the MHMS, particularly such diseases like diarrhea.

## DESCRIPTION

### Objectives

Reduce the burden of diarrhea and other water related diseases and problems particularly among very young and old people in Kiribati. This will be achieved by improving over the period of three years, 500 ground water wells that are used by the communities for their drinking and cooking.

### Activities

Cements, polythene, “Tamana hand pumps”, and moulds for wells will be provided. Environmental Health senior officials of the MHMS will introduce the project to each of the outer islands local councils, and work with island based sanitarian aides, water technicians, and the village welfare groups to implement the project.

Improvement will build up concrete lining, parapet, lid, and apron. “Tamana hand pump” will replace the current use of a container dipped into the well. Communities will do all the required work for their wells, under supervision of sanitarian aide and water technician.

The Environmental Health Division will monitor the project and report as well to the CCST on progress. Data base will be set up for this monitoring.

### Outputs

- 500 ground water wells are protected;
- Monitoring system is established;
- Regular visits by the Environmental Health Division staff to outer islands support the project;
- Incidence of diarrhea illness is reduced.

## COST

<i>AUD 336,470 (+10% contingency cost)</i>
--------------------------------------------

<b>Indicative costs (AUD)</b>	<b>Local annual budget (AUD)</b>	<b>Total NAPA Costs Over 3 yrs</b>	<b>Responsible Ministry</b>
146 000	190 470	336 470	MHMS

# LESOTHO

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## NAPA PRIORITY PROJECT 5

### SECURING VILLAGE WATER SUPPLY FOR COMMUNITIES IN THE DROUGHT PRONE SOUTHERN LOWLANDS

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#### RATIONALE

The supply of adequate and good quality water is essential for people's livelihoods especially in the rural communities. The southern lowlands livelihood zone supports approximately 279,000 people. Historically communities relied on collection of surface water and use of natural springs. Increasingly these sources are insufficient and many boreholes have been sunk. In the southern lowlands for example, Mafeteng has some 22 percent of the total number of boreholes in Lesotho with an average yield of 41 percent of the national average. On the other hand, in Mohale's Hoek (Taung & Mekaling) communities have particular problems of water shortage despite the fact that about 65 percent of the population in this area had been covered through water projects in the late 1990s.

The foregoing problems will be exacerbated by extreme and frequent drought occurrence. It is the recurring drought and the overall diminishing amount of rainfall that are the source of grave concern for the sustainability of sources of domestic water in the southern lowlands of Lesotho. This has had dire consequences for the livelihood and well-being of the people in the region particularly the vulnerable rural communities.

The burgeoning rural communities are placing mounting pressure on the already precarious water resources. Thus, the need to institute measures for sustainable management of water resources is imperative.

DESCRIPTION**Objectives and Activities**

<b>Objective</b>	<b>Activity</b>
<b>To improve community access to clean and optimal water supply</b>	<ul style="list-style-type: none"> <li>a. Building tanks for roof water harvesting</li> <li>b. rehabilitation of boreholes and silted collection points</li> <li>c. Install community water purification systems and procure requisite equipment e.g. testing kits</li> <li>d. Introduce well fields artificial recharge concepts</li> </ul>
<b>To increase a network of water collection systems and points for the affected communities</b>	<ul style="list-style-type: none"> <li>a. Identify new well fields and sink boreholes for water supply in the communities.</li> <li>b. Increase collection of spring water by use of pipes and distribution tanks.</li> </ul>
<b>To improve community capacity to manage the demand and usage of water.</b>	<ul style="list-style-type: none"> <li>a. Promotion of water recycling</li> <li>b. Implementing integrated catchment management systems</li> <li>c. Develop and promote community policies on sustainable use of water.</li> </ul>

**Inputs**

The inputs in this project will be:

- Technical expertise in the different areas of development of water collection systems and water collection points
- Financial resources for the acquisition of equipment and materials

**Short-Term Outputs**

- More and improved water collection systems and water collection points
- Clean and adequate water supply for household use particularly for rural communities
- Improved water supply infrastructure

**Potential Long-Term Outcomes**

The major potential outcomes of this project are:

- Adequate supply and environmentally sustainable use of water resources in rural communities.
- Improved quality of water for storage purposes
- Improved quality of people's livelihoods

IMPLEMENTATION**Institutional Arrangement**

The lead departments in the implementation of this project will be the Department of Rural Water Supply in collaboration with the Department of Water Affairs supported by ministry of Local Government including community based structures and relevant civic organizations.



### Risks and Barriers

Potential inhibitors for the implementation and success of the project include:

- Inadequate support and involvement of critical stakeholders
- Insufficient financial resources
- Vandalism of installed water systems

### Evaluation and Monitoring

The project will be monitored and evaluated by the Commissioner of Water. Monitoring will be done on monthly basis by the Department of Rural Water Supply through inspection and community gatherings. Quarterly progress and financial reports will be prepared during the implementation of the project.

### COST

*Estimated at USD 1,170,000*

<b>Activities</b>	<b>COSTS (USD)</b>
Building tanks for rain water harvesting	100 000
Rehabilitation of bore holes and silted collection points	100 000
Installation of community water purification systems and procurement of requisite equipment	150 000
Introduce well fields artificial recharge	170 000
Increase coverage of well fields and boreholes for water supply	100 000
Increase collection of spring water by use of pipes and distribution tanks	100 000
Promotion of water recycling	50 000
Implementing integrated catchment management systems	250 000
Develop and promote community policies on sustainable use of water	150 000
<b>Total</b>	<b>1 170 000</b>

# MADAGASCAR

## NAPA PRIORITY PROJECT 002

### MISE EN PLACE ET REDYNAMISATION DES ASSOCIATIONS DE GESTION DE L'EAU

#### DESCRIPTION

La gestion durable et efficace des ressources en eau dépend surtout des comités de base ou les associations bénéficiaires du projet. Les groupes vulnérables le plus touchés de ce projet sont: les petits exploitants agricoles, les petits éleveurs.

#### **Objectif**

La responsabilisation des bénéficiaires à la gestion durable des ressources en eau tient une place importante dans ce projet

#### **Activités**

1. IEC sur l'importance de la gestion durable des ressources en eau;
2. Regroupement des paysans qui ont les mêmes intérêts sur l'utilisation de ressources en eau;
3. Renforcement de la capacité des association existantes et nouvellement implantées.

#### **Intrants**

Des chercheurs spécialistes en pêche maritime; Des formateurs communicateurs; Spécialiste en environnement marin et côtier; Agents assermentés pour l'élaboration des procès verbaux de constat de délit; Moyens matériels et financiers pour l'encadrement technique et le contrôle et suivi de l'effectivité d'application des lois et réglementations, le groupement des bénéficiaires

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

- Les populations en monde rural conscient de l'importance de l'eau;
- Association des usagers de l'eau mise en place.

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

- Associations capables de gérer les ressources en eau existantes dans leur localité;
- Rendement agricole en hausse;
- Superficie cultivée augmente;
- Autosuffisance alimentaire.

#### MISE EN OEUVRE

#### **Arrangements institutionnels**

MAEP; MINENVEF; Autorités régionales; Associations des Usagers de l'Eau

#### **Risques et obstacles**

- Capacité d'assimilation de la population cible;
- Faible niveau d'instruction des paysans.

EVALUATION, SUIVI ET RESSOURCES FINANCIÈRES

*Total: USD 60 000*

Indicateur objectivement vérifiable (IOV)	Montant (USD)		
	ANNEE 1	ANNEE 2	ANNEE 3
Nombre des associations mise en place	30 000	30 000	0
<b>TOTAL</b>			<b>60 000</b>

# MALDIVES

## NAPA PRIORITY PROJECT 3

### ENHANCE ADAPTIVE CAPACITY TO MANAGE CLIMATE CHANGE RELATED RISKS TO FRESH WATER AVAILABILITY BY APPROPRIATE TECHNOLOGIES AND IMPROVED STORAGE FACILITIES

#### RATIONALE

Airports, especially the two international airports are amongst the most critical economic infrastructures of Maldives due their importance in the limited transportation network. The tourism industry is almost entirely dependent on the proper functioning of the international airports. Due to the major import dependency of food, the functioning of the airports is also extremely important for the food security of the country. At times of disasters it is also the main entry point for international aid, the main distribution points of emergency aid and perhaps the main evacuation point at times of a major disaster. Unfortunately, due their low elevation and proximity to coastline, the infrastructure of the five main airports are highly vulnerable to damage from severe weather related flooding and future climatic change. In the past, during natural disasters and severe weather events, airport operations have been interrupted due to extensive flooding of main infrastructures. This project focuses on the protection of the Male' International Airport (MIA). The Maldives Airports Company (MAC) also identifies this as a priority but the lack of financial resources to undertake such a large scale protection of the infrastructure has been a barrier against implementation of the required coastal protection. The proposed project for the NAPA aims to facilitate the construction of appropriate coastal protection for the MIA and ensure that risks from climate change impacts are adequately addressed in the design of the coastal protection measures.

#### DESCRIPTION

##### **Goal**

Reduce vulnerability of the Male' International Airport (MIA) to current climate risks and future climate change risks.

##### **Objective**

Protect MIA from sea induced hazards and predicted climate change impacts.

##### **Activities**

1. Undertake detailed technical and engineering studies for the coastal protection of MIA, including cost-effectiveness of the proposed solutions;
2. Develop detailed engineering and design of coastal protection measures for MIA
3. Construction of demonstration coastal protection measures on part of the coastline of MIA

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

- Technical and feasibility studies developed for the coastal protection of MIA;
- Appropriate coastal protection measures identified for MIA;
- Detailed design developed for coastal protection of MIA;

- Climate change concerns addressed in the design and engineering for MIA coastal protection;
- Appropriate coastal protection demonstrated.

#### Potential long-term outputs

- Increased resilience of the main economic sectors, tourism and fisheries, to predicted climate change impacts;
- Increased resilience to food security and local food distribution;
- Increased capacity to adapt to disasters and predicted climate change impacts.

### IMPLEMENTATION

#### Institutional arrangements

##### Lead agency

Maldives Airports Company

##### Project Partners

Ministry of Transport and Communication; Ministry of Construction and Public Infrastructure; Ministry of Environment, Energy and Water

#### Risks and Barriers

High capital investment cost

#### 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 9,300,000*

An activities based budget for the project is given below.

Activity	Cost (USD)
1. Undertake detailed technical and engineering studies for the coastal protection of MIA, including cost-effectiveness of the proposed solutions	220 000
2. Develop detailed engineering and design of coastal protection measures for MIA	
3. Construction of demonstration coastal protection measures on part of the coastline of MIA	9 080 000
<b>Total</b>	<b>9 300 000</b>

# MALDIVES

## NAPA PRIORITY PROJECT 5

### ENHANCE ADAPTIVE CAPACITY TO MANAGE CLIMATE CHANGE RELATED RISKS TO FRESH WATER AVAILABILITY BY APPROPRIATE WASTEWATER TREATMENT TECHNOLOGIES

#### RATIONALE

The NAPA process has identified that the inappropriate treatment and disposal of wastewater in the Maldivian islands is an important area that has to be addressed in terms of adaptation to climate change. This would address the identified adaptation strategies for water resource protection, promoting healthy lifestyles and islands and protection of the coral reef biodiversity in the Maldives. The Indian Ocean Tsunami of 2004 caused the destruction of the poorly constructed sewerage systems in the impacted islands of Maldives. This led to contamination of the freshwater resources and caused subsequent health problems. This event demonstrates what similar impacts from climate change would cause. The access to safe drinking water, the provision of sanitation and the promotion of hygiene are the foundations of human dignity, public health and economic and social development and are among the priorities for Maldives outlined in the 7NDP.

The prevailing systems of sanitation in most of the islands depends on-site disposal systems using septic tanks and soak-pits. The government has started a programme to improve the sanitation situation of the islands. This project will look into demonstrating appropriate wastewater treatment technology and improving the design of existing systems and thereby complement the existing government programme by incorporating climate change related issues. This project will also help the Maldives achieve MDG targets to halve by 2015 the number of people without access to basic sanitation, and to halve by 2015 the proportion of people without sustainable access to safe drinking water. Although the project is targeted to reduce vulnerability to climate change and particularly extreme events, the project will lead to many cross-cutting benefits such as protection of water supplies, address land and marine-based sources of pollution, related downstream coastal area management, protection of coral reef biodiversity, sustainable management of fisheries, and tourism development. The project will be implemented in an island selected for development as a Safer Island under the national development planning.

#### DESCRIPTION

##### Goal

To increase resilience of water resources, human health and coral reef biodiversity to climate change related hazards by improving present wastewater treatment and disposal capacity.

##### Objective

1. Identify and demonstrate innovative, appropriate and cost-effective wastewater treatment and disposal systems;
2. Educate the community on appropriate wastewater treatment.

##### Activities

1. Design and construct appropriate wastewater treatment and disposal system;

2. Develop information material for public on best practices on wastewater treatment

#### Short-term outputs

- Demonstration of appropriate wastewater treatment and disposal
- Community educated on best practices for wastewater treatment

#### Potential long-term outputs

- Improved health and well-being of community
- Protection of ground water aquifer from contamination
- Assist in achieving national targets on access to safe sanitation

### 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 organizations.

#### Risks and Barriers

- High initial capital investment;
- Lack of access to models and demonstrations of sewage and wastewater management technologies;
- Lack of appropriate policy, legislation, planning and administration.

#### 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 1,500,000*

An activities based budget for the project is given below.

Activity	Cost (USD)
1. Design and construct appropriate wastewater treatment and disposal system	1 300 000
2. Develop information material for public on best practices on wastewater treatment	200 000
<b>Total</b>	<b>1 500 000</b>

# MALI

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## NAPA PRIORITY PROJECT NO. 8

OPTION: RÉALISATION DE FORAGES ÉQUIPÉS DE POMPES SOLAIRES  
OU À ÉOLIENNES

TITRE DU PROJET: RÉALISATION DE FORAGES ÉQUIPÉS DE POMPES  
SOLAIRES OU À ÉOLIENNES

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Localisation: Régions de Kidal, Tombouctou, Gao  
Secteur: Ressources en Eau, Agriculture

### JUSTIFICATION

Malgré les gros efforts déployés par l'Etat et ses partenaires au développement, l'approvisionnement en eau pour les besoins des populations et du cheptel reste une priorité pour le septentrion malien qui dispose cependant d'importantes ressources en eau souterraine. L'obstacle majeur reste le coût de la mise à la disposition des populations de ces eaux souterraines par le biais des moyens modernes d'exhaure (pompes solaires ou à éoliennes).

Le projet consiste en la création des points d'eau modernes pour l'alimentation des populations et de leur cheptel et un appui au développement des cultures irriguées.

### DESCRIPTION

#### Objectif global

Contribuer à la mobilisation des ressources en eau pour la réduction de la pauvreté et l'amélioration de la sécurité alimentaire dans les zones cibles.

#### Objectifs spécifiques

- Augmenter le taux de satisfaction des besoins en eau des populations et du cheptel des zones concernées,
- Accroître le volume des productions agricoles (agriculture, élevage, pêche),
- Contribuer à la protection de l'environnement.

#### Faisabilité technique

- Existence des potentialités en eau dans les localités;
- Maîtrise des techniques de mobilisation des eaux par les services techniques;
- Besoins exprimés par les populations lors des missions de terrain;
- Les objectifs du projet cadrent avec les orientations du CSLP.

#### Faisabilité financière

- Appui du FEM;
- Apport de l'Etat;
- Apport des collectivités;
- Apport des communautés bénéficiaires;
- Existence d'un certain nombre de projets dans la zone du projet.

#### Résultats attendus

- Des points d'eau modernes d'alimentation en eau potable sont créés ou réhabilités;



- Des ouvrages de captage d'eau souterraine (forages, puits, puisards...) à but agricole sont créés ou réhabilités;
- Des cultures irriguées et le petit élevage sont promus autour de ces points d'eau;
- Des activités de pêche et de pisciculture sont réalisées;
- Des sites sont reboisés.

#### Activités

- La création et/ou la réhabilitation des points d'eau modernes d'alimentation en eau potable;
- L'aménagement des points d'eau de surface;
- La création et/ou la réhabilitation des ouvrages de captage d'eau souterraine destinés à la petite irrigation (forages, puits, puisards..);
- Le développement des cultures irriguées autour de ces points d'eau;
- La réalisation des activités de pêche et de pisciculture;
- Le reboisement;
- Suivi-évaluation.

#### Risques liés au projet

Retard sur le décaissement des fonds et déficit pluviométrique.

#### Arrangement institutionnel

Le Projet sera exécuté sous la tutelle du Ministère de l'Hydraulique des Mines et de l'Energie, appuyé par un Comité National de Pilotage composé de toutes les parties concernées.

### SUIVI-ÉVALUATION

#### Indicateurs de suivi-évaluation

- Taux de couverture des besoins en eau,
- Taux de croît de la production agro-sylvo-pastorale.

#### Mécanisme de suivi-évaluation

Le projet connaîtra des revues à mi-parcours et une évaluation finale, ainsi que des visites de terrain. De même, il sera produit des rapports d'avancement intermédiaires et annuels, ainsi qu'un rapport final.

#### Durée

Trois (03) ans

### COÛT

<i>USD 1,500,000</i>
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# MALI

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## NAPA PRIORITY PROJECT NO. 11

### OPTION: MAÎTRISE DES EAUX DE RUISSELLEMENT

#### TITRE DU PROJET: CAPTAGE DES EAUX DE RUISSELLEMENT, CRÉATION ET RESTAURATION DES POINTS D'EAU.

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Localisation: Toutes les régions du pays  
Secteurs: Ressources en Eau, Agriculture

#### JUSTIFICATION

L'économie Rurale malienne se caractérise actuellement par une faible performance des systèmes de production agricoles et pastorales liés entre autres au déficit pluviométrique et à l'insuffisance des ressources disponibles en eau de surface.

Le présent projet consiste au captage des eaux de ruissellement pour la réhabilitation des anciens points d'eau d'une part et à la création des points d'eau modernes d'autre part. pour l'alimentation des populations et de leur cheptel ainsi que pour la promotion des activités de maraîchage, de cultures irriguées et de reboisement autour des points d'eau.

#### DESCRIPTION

##### Objectif global

Contribuer à la réduction de la pauvreté et à l'amélioration de la sécurité alimentaire par la mobilisation des ressources en eau.

##### Objectifs spécifiques

- Rehausser le taux de satisfaction des besoins en eau des populations et du cheptel des zones concernées,
- Accroître la productivité des systèmes de productions agricoles (agriculture, élevage, pêche),
- Contribuer à la protection de l'environnement.

##### Faisabilité technique

- Existence des potentialités en eaux de ruissellement dans les localités;
- Maîtrise des techniques de mobilisation des eaux par les services techniques;
- Besoins exprimés par les populations lors des missions de terrain;
- Les objectifs du projet cadrent avec les orientations CSLP.

##### Faisabilité financière

- Appui du FEM;
- Apport de l'Etat;
- Apport des collectivités;
- Apport des communautés bénéficiaires;
- Existence d'un certain nombre de projets dans la zone qui peuvent apporter des synergies.

**Résultats attendus**

- Des points d'eau modernes d'alimentation en eau potable sont créés ou réhabilités;
- Des plans d'eau de surface sont aménagés;
- Des ouvrages de captage d'eau de surface à but agricole pastoral ou piscicole sont créés ou réhabilités;
- Des cultures irriguées et le petit élevage sont promus autour de ces points d'eau;
- Des activités de pêche et de pisciculture sont réalisées;
- Des sites sont reboisés.

**Activités**

- La création et/ou la réhabilitation des points d'eau modernes d'alimentation en eau potable,
- L'aménagement des points d'eau de surface,
- La création et/ou la réhabilitation des ouvrages de captage d'eau de surface destinés à la petite irrigation,
- Le développement des cultures irriguées autour de ces points d'eau,
- La réalisation des activités de pêche et de pisciculture,
- Le reboisement,
- Suivi-évaluation.

**Risques liés au projet**

Retard sur le décaissement des fonds et déficit pluviométrique.

**Arrangement institutionnel**

Le Projet sera exécuté sous la tutelle du Ministère des Mines , de l'Energie et de l'Eau appuyés par un Comité National de Pilotage composé de toutes les parties concernées.

**SUIVI-ÉVALUATION****Indicateurs de suivi-évaluation**

- Taux de couverture des besoins en eau,
- Taux de croissance de la production agro-sylvo-pastorale,
- Taux de réduction du chômage des jeunes.

**Mécanisme de suivi-évaluation**

Le projet connaîtra des revues à mi-parcours et une évaluation finale, ainsi que des visites de terrain. De même, il sera produit des rapports d'avancement intermédiaires et annuels, ainsi qu'un rapport final.

**Durée**

Trois (03) ans

**COÛT**

*USD 280,000*

# MAURITANIA

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## NAPA PRIORITY PROJECT 1

### MAURITANIA NAPA SECTION 7.4 WATER

#### CONTRIBUTION TO A BETTER KNOWLEDGE OF THE SURFACE WATER REGIMES IN TWENTY (20) CATCHMENT AREAS

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Locality: Ecological zones: fluvial, pluvial and oasis

Sector: Water

Field: Mainland surface water

Type: Institutional

PIP Reference: Water and Pastoral Village Project in the Sahel region

#### RATIONALE

The catchment areas with unknown regimes in the three ecological zones of the country, in case of heavy precipitation, or extreme drought, generate significant socio-economic damage.

Consequently a contribution to the knowledge of their hydrological regime constitutes a priority. Hence the necessity to carry out evaluation studies of the resource by setting up functional networks for hydrological monitoring, enabling early alarms to be sounded to protect people and their property against disaster: Flooding and/or drought.

#### DESCRIPTION

##### General objective

The improvement of the state of knowledge on the resources in mainland surface water with regard to the three ecological zones of the country, with a view to rational management.

##### Specific objectives

- Establishment of networks of operational measures;
- Publication of monthly news bulletins during the rainy season;
- Capacity building.

##### Expected outcomes

- Establishment of a functional network;
- Reports on resource development published periodically;
- Quantity of training carried out.

##### Activities

- Acquire the material before the rainy season;
- Install the monitoring tools;
- Recruit management staff, agents, observers in the field;
- Organise measurement and data collection campaigns;
- Data processing;
- Disseminate news flashes, periodic reports and almanacs on the development of resources;
- Take part in workshops and in advanced training courses;

- Create awareness of methods of saving water;
- Provide advice to the various contributors.

#### IMPLEMENTATION

##### **Administrative arrangements**

- The Department of Rural Development will carry out the project in cooperation with the state structures concerned, the private sector, donors, civil society and local communities.
- The project is initiated by NAPA and will be supervised by its steering committee.
- The management of human and material resources (management staff, agents, observers, field and office equipment) of the project is defined as well as users' participation in the protection of the tools and data collection.

##### **Risks and obstacles**

- Floodings/ droughts;
- Pollution;
- Increased rural exodus;
- Bottlenecks.

##### **Monitoring and assessment**

- Reports, minutes, field visits, inspections midway through the process, audits, etc, providing performance and impact indicators including:
- Number of monitored and equipped catchment areas;
- Number of trained and recruited observers;
- Number of recruited management staff and agents;
- Estimate of losses avoided or reduced through early warning messages.

##### **Duration**

3 years

#### COST

<i>USD 423,990</i>
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# MAURITANIA

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## NAPA PRIORITY PROJECT 2

### MAURITANIA NAPA SECTION 7.4 WATER

#### CONTRIBUTION TO INCREASED VALUE OF SURFACE WATER BY CONSTRUCTION OF TWELVE (12) FLOODING DECELERATION GATES: PLUVIAL ZONES (GUIDIMAKHA) AND ESPECIALLY OASIS ZONES (ADRAR)

---

Location: Wilayas of Adrar and Guidimakha

Sector: Water

Field: Mainland surface water

Type: Investment

PIP Reference: Dam construction in the Affole

#### RATIONALE

The removal of water for agricultural, pastoral, mineral and industrial needs continues to increase in support of development. This situation has led to an ever-increasing pressure on the very limited resources of fresh water, which are vulnerable and very unevenly distributed in space and time in an arid country.

These devices are necessary in the oasis and/or pluvial zones where intensive irrigation and Walo crops are impossible.

#### DESCRIPTION

##### General objective

Construction of flooding deceleration gates to increase the availability of water in the water table.

##### Specific objectives

- Availability of water from the water table to ensure use in various seasons;
- Improvement of the living conditions of communities in the project zone;
- Decrease in GHG emissions.
- Expected outcomes
- Work effectively carried out;
- Drop in rural poverty observed;
- Decrease in GHG emissions.

##### Activities

- Increase staff;
- Carry out studies;
- Organize workshops for preventive maintenance and repair of works;
- Increase productivity;
- Reduce the time devoted to fetching water;
- Decrease the rate of GHG emissions.

## IMPLEMENTATION

### **Administrative arrangements**

The Department of Rural Development will carry out the project in cooperation with the state structures concerned, the private sector, donors, civil society and local populations.

The project is initiated by NAPA and will be supervised by its steering committee. The management of human and material resources (management staff, agents, field and office equipment) of the project is defined as well as the users' participation in the implementation of the project.

### **Monitoring and assessment**

- Reports, minutes, field visits, reviews midway through the process, audits, etc. containing certain competence and impact indicators including: number of devices installed;
- Increase in agricultural productivity;
- Decrease in fetching of water;
- Number of communities trained;
- Diversification of activities.

### **Risks and obstacles**

- Degradation of the environment;
- Silting up and filling with sand of basins;
- Abandonment of land;
- Increased rural exodus;
- Conflicts of competence;
- Bottlenecks.

### **Duration**

4 years

### COST

<i>USD 604,170</i>
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# MAURITANIA

## NAPA PRIORITY PROJECT 3

### MAURITANIA NAPA SECTION 7.3 AGRICULTURE

#### PROMOTION OF WATER-SAVING IRRIGATION METHODS IN OASIS ZONES (DRIP METHOD PILOT SCHEMES)

Locality: Adrar, Tagant, Assaba, Hodh Gharbi and Hodh Charghi

Sector: Rural Development

Field: Agriculture

Type: Pilot investment project

PIP Reference: Rural development in the Adrar Oases

#### DESCRIPTION

##### Objectives

- Promotion of water-saving irrigation methods: the drip technique through pilot schemes provided for by the scope of this project;
- Reduction of pumping costs;
- Improvement of producers' expertise.

##### Activities

- Implementation of activities to create awareness and to identify the sites which will be covered by the project through missions, diagnostic research, etc.;
- Training of fruit growers in network maintenance through training courses, seminars, meetings, etc.;
- Acquisition and the installation of pumping equipment and of the irrigation network;
- Monitoring and the maintenance of networks;
- Support to producers and their SPOs for establishment of workshops (units) for construction and maintenance of this type of network to ensure the widest dissemination among the producers and to ensure its permanence.

##### Expected outcomes

- Improvement in productivity of the palm tree and of related crops;
- Increase fruit growers' incomes through the decrease of costs of pumping;
- Rational management of the water from the water table by the restriction of losses due to the traditional irrigation method through open culverts;
- Protection of palm trees against contamination by germs capable of causing dangerous plant disease such as Bayoud disease;
- Reduction of the rural exodus and ensuring the populations' nutritional and food security;
- Contribution to national food security.

#### IMPLEMENTATION

##### Administrative arrangements

The project will be carried out by the Department of Agriculture which will set up a small steering structure for the project following a participatory process. It is also important that a broad, efficient and effective partnership be developed with fruit



growers, the associations, cooperatives and national and international NGOs involved in the oasis sub-sector, the central and regional technical departments of MRDE, private sponsors and other stakeholders in oasis development

**Risk and obstacles**

- Reluctance of producers;
- Delay in acquisition of equipment or in obtaining funding.

**Monitoring and assessment indicators**

- productivity of the palm tree and of sub-oasis crops;
- Farmers' income;
- Oasis populations' nutritional and food level;
- Permanent establishment of communities on their land (level of rural exodus);
- fertilizer protection.

**Duration**

3 years

**COST**

*USD 1,200,000*

# MAURITANIA

## NAPA PRIORITY PROJECT 4

### MAURITANIA NAPA SECTION 7.4 WATER

#### EDUCATION IN THE USE OF FIFTY (50) ELECTRIC MOTOR PUMPS IN THE VALLEY

Locality: Fluvial zone

Sector: Water

Field: Mainland surface water

Type: Investment

PIP Reference: Not included in PIP

#### RATIONALE

Increase in value of the (OMVS) high tensions electrical lines serving the right bank of the Senegal river;

Substantial saving on the national energy bill;

Contribution to decrease of GHG emissions.

#### DESCRIPTION

##### General objective

Improvement of agricultural productivity in the valley through irrigation by electric motor pumps.

##### Specific objectives

- Irrigation of 1,000 hectares by electric motor pumps;
- Saving on foreign exchange;
- Decrease in GHG emissions.

##### Expected outcomes

- Surface area irrigated by hydro-electric motor pumps increased;
- Rate of GHG emissions decreased;
- Saving on foreign exchange achieved.

##### Activities

- Install electric motor pumps in the framework of a pilot project of 1,000 hectares which have already been rehabilitated;
- Organize awareness, training and education campaigns;
- Recruit and train five (5) engineers for management, agents and support staff;
- Decrease significantly the use of GMP (gas-oil);
- Ensure the timely maintenance and repair of electric MP;
- Extend the experiment beyond the project.

#### IMPLEMENTATION

##### Administrative arrangements

The Department of Rural Development will carry out the project in cooperation with the state structures concerned, the private sector, donors, civil society and local populations.

The project is initiated by NAPA and will be supervised by its steering committee. The management of human and material resources (management staff, agents, field and office equipment) of the project is defined as well as the users' participation in the implementation of the project.

#### **Monitoring and assessment**

Reports, minutes, field visits, reviews midway through the process, audits, etc., containing certain competence and impact indicators including:

- number of tasks achieved;
- increase in agricultural productivity;
- decrease in fetching of water;
- number of communities trained;
- Diversification of activities.

#### **Risks**

- Pollution and unmitigated harmful effects;
- Technologies which have not been fully mastered;
- Increased rural exodus;
- Conflict of areas of competence;
- Bottlenecks.

#### **Duration**

3 Years

#### **COST**

*USD 1,050,630*

# MAURITANIA

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## NAPA PRIORITY PROJECT 5

### MAURITANIA NAPA SECTION 7.4 WATER

#### SUPPORT TO THE DISSEMINATION OF THE DRIP TECHNIQUE IN THE RIVER VALLEY AND THE OASIS ZONES FOR THE DEVELOPMENT OF 300 HECTARES

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Locality: Ecological zones (fluvial and oasis)

Sector: Water

Field: Mainland surface water

Type: Investment

PIP Reference: Water and pastoral village project

#### RATIONALE

The enormous use of water in the various sectors is resulting, given the worsening of the climate, in an ever-increasing pressure on the very limited resources of fresh water, which are vulnerable and very unevenly distributed in space and time in an arid country. It is in an effort to preserve such resources, that the drip method will be disseminated in the river valley and the oasis zones.

#### DESCRIPTION

##### General objective

Dissemination of the drip method in order to reduce the pressure on water resources.

##### Specific objectives

- Improvement of the living conditions of rural populations;
- Rational management of the water resource;
- Reduction of GHG emissions in the atmosphere.

##### Expected outcomes

- Optimal management of the resource adopted by the users;
- New water-saving cultivation methods adopted and spread throughout the country;
- GHG emissions reduced through the propagation of new methods more attentive to environmental degradation.

##### Activities

- Acquire field equipment;
- Collect data on consumption;
- Recruit five (5) engineers and agents;
- Arrange training and awareness raising workshops on the use of the drip method;
- Ensure the promotion of the equipment by reduction of prices;
- Dissemination of reports and almanacs on the development of the method and its appropriation by the targeted populations;
- Publicize the rate of avoided emissions.

## IMPLEMENTATION

### **Administrative arrangements**

- The Department of Rural Development will carry out the project in cooperation with the state structures concerned, the private sector, the donors, civil society and the local communities;
- The project is initiated by NAPA and will be supervised by its steering committee;
- The management of human and material resources (management staff, agents, field and office equipment) of the project is defined as well as the users' participation in the implementation of the project.

### **Risks and obstacles**

- Lack of input stocks;
- Lack of maintenance;
- Increased rural exodus;
- Conflicts of areas of competence;
- Bottlenecks.

### **Monitoring and assessment**

Reports, minutes, field visits, reviews midway through the process, audits, etc. containing certain competence and impact indicators including:

- Developed surface area;
- Number of trained rural inhabitants;
- Decrease in water expenditure;
- Rate of GHG emissions avoided.

### **Duration**

3 years

### COST

<i>USD 433,990</i>
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# MAURITANIA

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## NAPA PRIORITY PROJECT 13

### MAURITANIA NAPA SECTION 7.4 WATER

#### IMPROVEMENT OF MANAGEMENT OF UNDERGROUND WATER RESOURCES IN THE AFTOUT ZONE

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Locality: South and Central Mauritania (Brakna, Gorgol, and Assaba) Dhar water-bearing bed

Sector: Water

Field: Underground Water

Type: Institutional and Investment

PIP Reference: Not included in PIP

#### RATIONALE

The phenomena linked to climate changes have caused the scarcity of surface water, the drying up of wells and springs, the fall in the level of the water tables and the increase in salinity.

This situation is compounded by the marked increase in water use to meet agricultural, human, pastoral, mineral, and industrial requirements.

Fresh water resources are scarce, vulnerable and very unevenly distributed in space and time. It is essential therefore to implement a policy of:

- Rationalization of the use of the resource by the decrease in waste of the resource and by the population's participation in the burden of water costs (minor maintenance work on hydraulic equipment);
- Safeguarding of water quality through campaigns to create awareness of problems related to hygiene on water and by the establishment of protection zones around the water supply points.

#### DESCRIPTION

##### Objectives

To improve the quality of operation and use of the underground water resource in the Aftout (the Wilayas of Gorgol, Assaba and Brakna) in order to protect its quality to optimise water supply points .

##### Activities

- Carry out community awareness and activity campaigns on the use of water;
- Establish protection zones around water supply points;
- Make people participate in paying for the cost of water cost through the local communities;
- Organise the beneficiary communities into water point committees with manual pumps;
- Sign maintenance contracts with the National Agency for Drinking Water and Sanitation (NADWS) responsible for the thermal and solar DEP and SPM networks.

##### Expected outcomes

- Protection of the resource against pollution phenomena;

- Rationalization of use of the resource;
- State disengagement from minor maintenance work on pumping systems;
- Signature of management and maintenance contracts for places equipped with network of water supply with NADWS.

#### IMPLEMENTATION

##### **Administrative arrangements**

This project falls within the brief of the NADWS mission, and MRDE is to hand over the technical management of this project to MWE through a protocol of agreement. A coordination unit responsible for the financial management will be set up.

##### **Risks and obstacles**

The risks and obstacles of this project are:

- Conflicts of areas of competence between the NAPA authorities and NADWS;
- Refusal by the people to agree to the project targets.
- Monitoring and assessment indicators
- Number of water supply committees established;
- Number of protection areas created;
- Number of maintenance contracts signed;
- Number of pumps powered by humans and number of technicians trained;
- Number of awareness workshops organised.

##### **Duration**

3 Years

#### COST

This project fits into the framework of the adaptation measures related to climate change and complements the support project to the reform of the sectors of water, sanitation and energy. This project is initiated by NAPA and its request for funding is submitted to the partners in development.

*Estimated at USD 250,000.*

# MAURITANIA

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## NAPA PRIORITY PROJECT 21

### MAURITANIA NAPA SECTION 7.4 WATER

#### THE STUDY AND MONITORING OF WATER QUALITY IN THREE TOWNS: MAGTA LAHJAR, TINTANE AND WOMPOU

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Locality: Brakna (Magta Lahjar), Hodh El Gharbi (Tintane) and Guidimakha (Wompou).

Sector: Water

Field: Underground water

Type: Investment and research

PIP Reference: Projects for supplying drinking water (PSDW) to the provincial capitals of the Moughataa.

#### RATIONALE

Supplying drinking water to the localities of Maghta Lahjar, Tintane and Wompou is achieved through boreholes which capture water from the aquifer water table. The continuous drought and the significant exploitation of these water tables has caused a fall in the water level, a drop in the flow from the boreholes and deterioration of water quality, often thought to be caused by the high nitrate level.

This measure aims to identify new resources of water and monitor the development of the quality of water, and this will allow:

- Improvement of the knowledge of the water resources;
- Identification of new resources;
- Rational management of the resource;
- Possibility of anticipating crisis situations.

#### DESCRIPTIONS

##### Objectives

- To improve the conditions of provision of drinking water in quantity and quality to the populations of the three localities.
- To achieve these objectives, the following are required:

##### Activities

- Establishment of piezometric networks for monitoring;
- Establishment of a methodology for collecting and processing data;
- Achievement of new hydro-geological and geophysical investigations to identify new water resources;
- Creation of new water capture devices;
- Connecting new boreholes to Project to Supply Drinking Water networks.

##### Expected outcomes

- Functional observation network;
- Reliable collected, processed and disseminated data;
- Periodic reports published on the development of the resources
- Improved conditions of provision of water to the communities in quantity and quality.



### IMPLEMENTATION

This project falls within the brief of the National Centre For Water Resources (NCWR), and MRDE is to hand over the technical management of this project to MWE through a protocol of agreement and set up a coordination unit responsible for the financial management.

#### **Risks and obstacles**

The risks and obstacles of this project are:

- Conflicts of areas of competence between the NAPA authorities and the NCWR;
- Resource outage

#### **Monitoring and assessment indicators**

- Report on seasonal and annual fluctuations of the levels of water tables and annual forecasts;
- Hydro-geological annual statement of aquifers;
- Early warning system for crisis situations
- Savings at water points;
- Number of prospected sites;
- Number of completed productive boreholes;
- Improvement of conditions of provision of drinking water to communities.

#### **Duration**

3 Years

### COST

This project falls into the framework of the adaptation measures related to climate change.

This project is initiated by NAPA and its financing is submitted to the partners of development.

*Estimated at: USD 1,000,000*

# MAURITANIA

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**NAPA PRIORITY PROJECT 23**  
**MAURITANIA NAPA SECTION 7.4 WATER**  
**SUPPORT FOR THE EXPERIMENTAL USE DISSEMINATION OF THE**  
**DRIP METHOD IN THE OASIS ZONES**

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Locality: Oasis zones

Sector: Water

Field: Underground water

Type: Institutional

PIP Reference: Sustainable development of the oases in the Adrar Stage III

## RATIONALE

The need for water in the oasis zones is continually increasing, given the rapid population growth and sustained socio-economic development. This situation is compounded by an ever-increasing pressure on the freshwater water tables, which is scarce, vulnerable and very unevenly distributed in time and space.

The supply of water in the oasis zones is carried out through a large number of wells equipped with motor pumps (e.g.: 500 motor pumps in Tawaz in Adrar) which capture alluvial water tables of which the reserves are limited and dependent on rainfall. This abnormal use of water tables leads to the irreversible destruction of their hydrodynamic characteristics. To combat this scourge, it is necessary to introduce new methods of irrigation to decrease the pressure on the water-tables

## DESCRIPTION

### Objectives

- To improve the socio-economic development of communities of the oasis zones;
- To optimise the use of the water resource
- To ensure the permanence of the oases through sustainable management of alluvial water-tables;
- To decrease the number of motor pumps and the volume of water removed;
- To decrease the GHG emissions in the atmosphere.

### Activities

To fulfil these objectives, the following activities are required:

- Experimental use of the drip method on ten (10) farmers in the oasis zones;
- Organization of monitoring campaigns on the development of the resource;
- Drafting of reports and almanacs on the development of the method and its appropriation by the targeted populations;
- Organization of training and awareness workshops;
- Propagation of the method.

### Expected outcomes

- Resource sustainably managed on the basis of pertinent technical and scientific information;
- Competent and optimal management of the resource adopted;

- Introduction of new water-saving cultivation methods adopted;
- Decrease in GHG emissions by the popularization of new irrigation methods more attentive to the degradation of the environment.

#### IMPLEMENTATION

##### **Administrative arrangements**

This project could be managed by the Department of Agriculture or by a coordination unit responsible for the management of NAPA projects.

##### **Risks and obstacles**

The risks and obstacles of this project are:

- Conflicts in the area of competence between the various departments of MRDE and the projects concerning the oasis zones;
- Refusal by farmers to agree to project targets;
- Inputs stock outage;
- Mastering the method.
- Monitoring and Assessment indicators
- Evolution of the developed areas;
- Increase in productivity;
- Savings at the water point;
- Reduction of parasitic plants on the farms.

##### **Duration**

2 years

#### COST

This project fits into the framework of the adaptation measures related to climate change and complements the rural development oasis project in Adrar by its management of the resource of water. This project is initiated by NAPA and its funding is submitted to the partners in development.

*Estimated at USD 400,000.*

# MAURITANIA

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## NAPA PRIORITY PROJECT 27

### MAURITANIA NAPA SECTION 7.4 WATER

#### SUPPORT FOR IMPROVED MONITORING OF THE PIEZOMETRIC NETWORKS OF THE WATER TABLES OF AÏOUN SANDSTONES AND OF THE HODHS PELITES

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Locality: South-East Mauritania (the 2 Hodhs and the Assaba)

Sector: Water

Field: Underground water

Type: Research

PIP Reference: Not included in PIP

#### RATIONALE

The chronic drought the country has witnessed during the last three decades has caused an ever-increasing pressure on underground water resources whose stocks are unknown and not monitored.

This option aims to monitor the quantitative and qualitative development of the stocks of underground water and it will make it possible to:

- Improve knowledge of the resources of water;
- Manage the resource rationally;
- Predict crisis situations;

#### DESCRIPTION

##### Objectives

The general objective of this project is to improve the state of knowledge of underground water resources on a countrywide scale and the specific objective is to ensure improved knowledge and sustainable management of resources of aquifer water from Aïoun sandstones and Hodhs pelites.

To achieve these objectives, it is necessary to carry out the following activities:

##### Activities

- Acquisition of the monitoring equipment;
- Installation of the functional observation network with monitoring stations equipped with automatic recorders;
- Organization of measurement and data collection campaigns;
- Drafting of periodic reports and almanacs;
- Functional monitoring network;
- Reliable collected, processed and disseminated data;
- Periodic publication of reports on the development of the resource.

##### Expected outcomes

- Sustainable management of the resource;
- Making water supply secure for communities, livestock and agriculture.

## IMPLEMENTATION

### **Administrative arrangements**

This project falls within the brief of the National Centre For Water Resources (NCRW), and MRDE is to hand over the technical management of this project to MWE through a protocol of agreement and set up a coordination unit responsible for the financial management

### **Risks and obstacles**

The risks and obstacles of this project are:

- Conflicts of areas of competence between the authorities of NAPA and NCRW;
- Resource outage.
- Monitoring and assessment indicators
- Number of trained observers, agents and management staff;
- Number of workshops to create awareness;
- Reports on the seasonal and annual fluctuations of water table levels;
- Hydro-geological annual statement of water tables;
- Early warning system for crisis situations.

### **Duration**

2 Years

## COST

This project fits into the framework of the adaptation measures related to climate change and complements the support project to the reform of the sectors of water, sanitation and energy which is funding the diagnostic studies and for restructuring the network.

This project is initiated by NAPA and its request for funding is submitted to the partners in development.

*Estimated at USD 800,000*

# MOZAMBIQUE

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## NAPA PRIORITY PROJECT 4

### FOURTH ACTION: MANAGEMENT OF WATER RESOURCES UNDER THE FRAMEWORK OF CLIMATE CHANGE

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#### INTRODUCTION

Mozambique has got a reasonable potential of both superficial and underground water resources. The country has got about 103 river basins, 13 of which have a drainage area of over 10,000 km<sup>2</sup> from north to the south, namely: Rovuma, Messalo, Lurio, Ligonha, Licungo, Zambezi, Pungoe, Buzi, Gorongosa, Inharrime, Govuro, Limpopo, and Incomati. Other relevant basins with a drainage area below 10,000 km<sup>2</sup> are Montepuez, Monapo, Save, Umbeluzi and Maputo. In addition, in all 9 river basins shared with other neighbouring countries, members of SADC, Mozambique is downstream.

According to available data, the total available flow is of about 216 km<sup>3</sup>/year of which 100 km<sup>3</sup> corresponding to 46% is generated in the country and the remaining 116 km<sup>3</sup> come from neighbouring countries. So, the largest quantity of water draining superficially through rivers come from outside Mozambique, something that requires a lot of effort in strengthening management norms or regulations to manage river resources with neighbouring countries.

Significant progress has been recorded, according to available information in relation to the installation of early warning systems close to river courses of Umbeluzi, Incomati, Limpopo, Buzi, Pungoe, Zambezi and Licungo, for considering that they are flood prone river basins. Relations arrangement between institutions linked to natural disasters management have been established, but they still do not meet the country's crying needs. Presently, the hydrometric network under operation is made up of 100 stations. Monitoring the quality of water is done only in the country's southern region and in sporadic measures elsewhere.

A phenomenon that occurs in low level events (drought) is saline intrusion, having as a result soil salinity, with negative reflex ion on agricultural and livestock activities, and also on the conservation of biological species. On the other hand, the low level of the rivers can led to a situation of loss of vegetation coverage, leaving a nude soil susceptible to erosion.

In events of high superficial flow (floods), there's in fertilization of soil with the displacement of nutrients by water. Various activities in different (agricultural, livestock, fisheries, transport, etc) sectors are interrupted.

Another phenomenon that deserves attention, with negative environmental impact, is pollution of river waters. The pollution of river waters represents a risk for the conservation of biodiversity. During a strong rainfall, the superficial flow of waters containing solid particles and other particles which are carried away by the flow running towards the rivers, turning river water more polluted and improper for human consumption, thus deteriorating the living conditions of communities that use the water for various activities. On the contrary, the available water for various community activities during the dry season is scarce resulting in loss of crops and animals, the shortage of water for cooking, dish-washing, personnel hygiene, etc.

The Southern Regional Water Board, ARA-Sul, in its (2004) Business Plan, recognizes the lack of both human and institutional capacity to monitor the environmental quality of water.

The National Water Policy (PNA) approved by the Mozambican government in 1995 introduced various reforms in the integrated management of river resources. The inclusion of water management aspects in environment laws, land laws approved in 1997, mining laws, fisheries laws, forestry and wildlife in subsequent years, are examples of the impulse that the approval of that policy brought about. The policy was reformulated and in its new version emphasis is given to the issue of floods and the objectives are to prevent human loss of lives and minimize the negative social and economic impacts of floods - loss of goods, damage in public and private infrastructures, disturbances of the social and economic life. In relation to drought, the policy envisages the following objectives: to prevent situations or hunger and the shortage of drinking water in rural areas resulting from generalized drought and minimize the impact of drought in the water supply in urban areas, agriculture and cattle. Concrete actions are proposed for the achievement of these objectives.

Mozambique is situated downstream the main river basins that cross through it, the quality and quantity of water that reaches the country depends on the activities carried out in countries through which the rivers cross before entering the country. These factors place challenges to the country ranging from the creation of water storage capacity in periods of abundance for later use in periods of shortages and the creation of technical and institutional capacity to manage floods, drought and actively participate in negotiations of shared water resources, clearly indicating the national needs in terms of minimal and ecological flow of rivers for the maintenance of eco-systems and the strengthening of floods early warning systems. In these negotiations, it's advisable that consideration should be given to the climate change once the vulnerability evaluation reports, particularly the Inter-governmental Panel Report, indicate that water constitutes the resource that is likely to generate future conflicts as a result of climate change.

#### RATIONALE OF THE PROPOSED ACTION

Mozambique has been suffering from the effects of extreme climatic changes of hydrologic nature, caused by low or high level superficial draining of waters through river basins that cross the country. The magnitude of the effects of drought and floods that have affected the country is extremely frightening by the fact that the control and evaluation system of the behaviour of the river water levels in the country's hydro graphic basins not to be at the demanding level.

According to existing studies, most of the river basins in the country's southern region are characterized by low water levels during the dry season and high levels during the rainy season according to studies carried out. The central and northern regions, the river water levels are regular. This shows the influence that climate factors have on the availability of water resources. In this context, the control and evaluation of the available water quantities in and for the country are of paramount social, economic and environmental importance. That's because it acts as a tool for adequate decision making in mitigating natural disasters derived from variations of the level of river waters of the country's existing hydrological basins which on their turn are the result of weak or strong rainfall

The control of the variations of the water levels of the hydrological basins demands an extensive and dense hydrometric network and hydro-meteorological network, as well as a technical assistance by professionally sensitive and responsible man. On the other hand, the evaluation and analysis of the water availability, taking into account climate variability, demand a long, continuous and safe series of hydrometric and hydro meteorological data. In addition to being few, the 100 hydrometric stations under operation show quality problems and, therefore, the quality of collected data is also poor. There's a need to expand and increase the density of the hydrometric stations, to improve the sharing of information related to water management among the various development sectors according to the National Strategy for Water Management (ENGA). The ideal for the country is to expand from 100 to 300 hydrometric stations and from about 800 to 1,000 pluviometric stations.

In terms of hydraulic infrastructures, there are only four dams distributed in the order of one by one of the main hydrological basins in southern Mozambique, built to control floods, irrigate and supply people with water. However, there's also the problem of lack of qualified personnel to deal with control and evaluation aspects of the river levels using modern technology. Now, capacity building in the technical viewpoint, following the evolution of technology used in the control of river waters will enable the improvement of the reduction of negative impacts resulting from low or high level of river levels.

Various sectors of national development have their actions conditioned to the availability of water resources; therefore, it's of paramount importance to involve different sectors in the management of water resources, especially under the framework of impact reduction of extreme hydrological events.

#### DESCRIPTION

##### **Objectives**

Improve the level of control and evaluation of the river waters, for the reduction of drought and flood impacts along the hydrological basins resulting from the increase or drop in the river water levels, from excess or lack of rain in the basin. This action aims specifically to:

1. Evaluate the control systems of the river water levels for a greater precision in the forecast on drought and floods.
2. Promote the improvement of the river water level control system through technical and capacity building of personnel linked to the collection and processing of hydrological data.
3. Elevate the systematic control level of river water quality.

##### **Expected results**

###### **Long term results I**

Human and material damage deriving from floods in hydrological basins minimized as a result of climate factor variability.

###### **Short term results I**

Improved control system of the river water levels compared with the level of neighbouring countries.



**Activities to develop**

1. Do the measurement of the transport of sediments in the main basins for the timely detection of morphological change of rivers.
2. Develop hydrological methods in all key hydrological basins.
3. Programme and do the regular calibration of equipment in hydrometric stations.
4. Promote the creation of basin committees in the country's biggest hydrological basins, with particular attention for those where irregularity of water levels are often recorded.
5. Identify and prioritize the training needs in different relevant issues such as: negotiations techniques, the holding evaluation studies of vulnerability and the integrated management of rivers.
6. Train technicians according to prioritized needs.

**Short term results II**

Improved and updated hydraulic infrastructures in the regional context.

**Activities to develop**

1. Identify the various conditions and needs along the rivers which require different specific solutions;
2. Build river water level protection and control dikes close to the hydrological basins in flood and drought prone areas;
3. Build protection barriers against saline intrusion close to estuaries;
4. Rehabilitate hydraulic infrastructures;
5. Reinforce the construction of new infrastructures in already identified locations by the water entities;
6. Reinforce the capacity of installed equipment operators close to the existing infrastructures through dam observation and maintenance courses.
7. Draw and implement infrastructure maintenance activities
8. Elaborate regulation instruments on security in the dams and other hydraulic infrastructures.

**Short term results III**

Improved the system to disseminate information

**Activities to develop**

1. Facilitate access to data through the Website close to the water board authorities (ARA's) and other potential users.
2. Extend the use of community radios in the publication of information in the appropriate format to the community level.
3. Create an exchange mechanism of information between SADC-HYCOS and other telemetric stations with the databank system of the ARA's.
4. Promote civic education campaigns close to the different groups, particularly those that carry out activities in the basins.

**Short term results IV**

Sharing of improved water course between Mozambique and neighbouring countries.

**Activities to develop**

1. Identify and prioritise river basins in which evaluation studies of vulnerability and adaptation are to be carried out.
2. Carry out studies in, at least, three river basins and conceive their integrated management plans;
3. Evaluate signed Agreements of Shared Resources;
4. Create a telemetric network and transborder hydrologic models.
5. Harmonize the format of the databank and the collection of data with neighbouring countries through the holding of regional seminars;
6. Formulate comprehensive agreements of water use in shared river basins under the guidelines of the SADC protocol.
7. Promote a continuous negotiation, for the establishment of regulations and agreements of water shared courses between countries of the southern African region.

**Long term results V**

Protected biodiversity along the main hydrological basins

**Short term results V**

Controlled national river water pollution

**Activities to develop**

1. Prepare a national inventory, on the extension of humid land, riverside ecosystems, with a base to guarantee its long term protection;
2. Evaluate the environmental status of some river basins where evasive species occur and propose recovery measures;
3. Establish the minimum ecological river water level in all hydrological basins;
4. Hold a continuous evaluation of water quality, and weed;
5. Identify source of water pollution and formulate appropriate control measures;
6. Strengthen effective water quality control measures;
7. Ensure the holding of environmental impact studies in water use projects, according to Mozambican Environment Law (LAM);
8. Draw more detailed and comprehensive emergency plans on water quality and protection of riverside ecosystems;
9. Promote community encouragement campaign for the practice of activities that do not harm ecological environment of hydrological basins;
10. Consolidate the close institutional collaboration between the regional water boards or ARAs and MICOA in the elaboration and observance of measures to protect water resources in the environmental perspective.

**Risks and Barriers**

The success in the implementation of this action depends on:

- The active participation of various intervenient sectors including the communities;
- The timely allocation of necessary resources for the holding of the listed activities;
- The level of responsibility and professionalism of affected readers in the stations and collected hydrological data processing centres.
- The strict collaboration between the intervenient.

### IMPLEMENTATION.

The implementation of listed activities in this action will be up to the DNA and ARA's, being institutions endowed with the management of water resources, in the installation and monitoring component of hydrometric stations; design and selection of appropriate models for the evaluation of water resources.

The National Institute of Meteorology (INAM) will have the responsibility of installing and monitoring hydro-meteorological stations, particularly the pluviometric component. It's also the entity responsible for the collection, processing and analysing climatological data.

The control of quality and pollution of water, the protection of riverside ecosystems (Biodiversity), elaboration of instruments to regulate the control of aquatic pollution, and guarantee its implementation will be of the responsibility of MICOA (UGA and DNGA),

MOPH, MAE, MCT, MINT, MEC, MINAG, MDefense, MFisheries, NGO's, and Research Institutions.

### BUDGET

*The budget is estimated at about 2,000,000 USD according to listed activities and operational costs.*

# NIGER

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## NAPA PRIORITY PROJECT 7

### NIGER NAPA IDENTIFICATION SHEET 7

#### WATER CONTROL: MOBILIZATION OF SURFACE WATER AND EXPLOITATION OF GROUND WATER

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#### GEOGRAPHIC LOCATION

Villages of Edouk I and Edouk II, and Kaou rural district (Department of Tchintabaraden/ Tahoua Region); Tondikiwindi rural district (Department of Ouallam/ Tillabéri Region)

#### SECTOR

Water resources, agriculture

#### RATIONALE

Niger rural economy is not very competitive due to limited capacities of the intensive agricultural production systems and deterioration of the forest resulting from climatic factors and human actions. This situation is more perceptible in the villages of Edouk I and Edouk II, Tondikiwindi rural district. The target beneficiaries will be the populations living in these areas vulnerable to climate variability and changes, particularly farmers and cattle breeders. The latter will improve their production techniques to make them more adequate. These populations have suffered difficult periods due to shortage of natural resources, which represent their livelihoods. However, there are unexploited resources and available labor force. Subsequently, a new vision must be created through the initiation of a project for the mobilization of surface water and exploitation of ground water in the area. This project is in line with the national orientations and strategies particularly the PRS which promote the control of surface water and a better mobilization of underground waters in order to direct the effort of the agricultural development towards the irrigated cultures taking into account climate uncertainties and the brittleness of Niger ecosystem. The project is aimed at creating modern water points for people and their livestock. It also consists of support for the improvement of crop irrigation and promotion of livestock farming and forestry activities around the existing, created or restored water points. The volume of surface water resources to be mobilized will depend on local geological realities.

#### DESCRIPTION

##### Overall objective

Contribute to the reduction of poverty and improvement of food security through the mobilization of water resources.

##### Specific objectives

- Increase the satisfaction rate of people and livestock's needs in the project areas;
- Improve agricultural productions (agriculture, livestock farming, fisheries);
- Contribute to the environment protection.

## Technical and financial feasibility

### Technical feasibility

- Existing water potentials in the two localities;
- Mastery of water mobilization techniques by the technical services;
- Needs expressed by beneficiaries during field visits;
- Existence of a national strategy for the development of irrigation and the collection of run-off water (SNDI/CER);
- The project objectives match the PRS orientations.

### Financial feasibility

- Support from GEF;
- Contribution from the government;
- Contribution from local authorities;
- Contribution from beneficiary communities;
- Presence of other projects in the project area ( PAC, Azawak Project, PPEAP, LUCOP, domestic and pastoral water resource resources, PMET...).

### Expected results

- Modern water points for providing drinkable water are created or rehabilitated;
- Stretches of surface water are developed;
- Farming-oriented infrastructures for harnessing ground water (borings, wells, cesspools, etc) are created or rehabilitated;
- Irrigated crops and small livestock farming are promoted around the water points;
- Fisheries activities are carried out;
- Enrichment planting carried out on the sites.

### Activities

- Creation and/ or restoration of modern water points for providing drinkable water;
- Development of surface water points;
- Building or rehabilitation of ground water harnessing infrastructures intended for the small irrigation;
- Improvement of crop irrigation around these water points;
- Carrying out fisheries activities;
- Reforestation;
- Monitoring and evaluation.

### Project-related risks

- Delay in cash flow;
- Rainfall deficit.

### Institutional set-up

The project will be implemented under the responsibility of the agricultural development departments in collaboration with the water resources services. The project will be supported by a running committee made up of all the parties working with the project. The coordination and the implementation monitoring will be carried out by the National Environmental Council for a Sustainable Development (CNEDD).

**Monitoring and evaluation**

## Monitoring and evaluation indicators

- Rate of water needs satisfaction;
- Agricultural, forestry and pastoral production growth rate;
- Rate of youth unemployment reduction.

## Monitoring and evaluation mechanisms

- The project will have mid-term and final reviews and field visits as well. Moreover, intermediate and final reports will be issued.

**Project duration**

Three years.

# RWANDA

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## NAPA PRIORITY PROJECT N° 3 REALISATION OF ROUND IRRIGATION PERIMETERS FROM WATER FLOWS IN VULNERABLE REGIONS.

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### LOCALISATION

Vulnerable regions of East and South East

### RATIONALE

Agro bio climatic regions of the East and South East of the country (Umutara, Kibungo, Bugesera, Mayaga) have been identified as vulnerable from many aspects particularly in relation to frequent droughts, which affect poor population. The realisation of irrigated perimeter project shall contribute to the improvement of adaptation capacity of agro-pastoralists to climate change through the set up of non-pluvial practices.

This project concerns some continuous water flows from which their waters may be exploited by simple methods to irrigate some plots favourable and productive in vulnerable regions of the East and South East.

The introduction of simple and sustainable methods of irrigation in gravity shall create some resilience among rural population in harmony with their environment. This shall help regroup the population in irrigation cooperatives from continuing water flows and encourage Imidugudu.

### INTEGRATION

Policy Integration (Policy, strategy, ongoing programme)

Policy / National strategy	Objective, Programme / Ongoing planning action or implementation
<b>Rwanda Vision 2020</b>	Sustainable management of water resources Modernization of agriculture
<b>Poverty reduction strategy</b>	Promotion of public works of high manpower intensity (HIMO)
<b>National land policy</b>	Technological improvement of agricultural sector
<b>National agriculture policy</b>	Irrigation especially in arid zones
<b>National strategy and action plan to fight desertification</b>	Management of natural resources
<b>National strategy and action plan for the conservation of biodiversity</b>	Conservation and rational and sustainable utilisation of agro ecosystems and biodiversity

### DESCRIPTION

Global Objective

Favour initiative of small farmers and pastoralists to practice agriculture and animal husbandry different from rain-fed practice in small-adapted plots for irrigation by gravity systems.

**Specific Objectives**

- Identify and improve the potentiality of micro-plots of productive lands downstream perpetual water flow
- Favour and introduce simple and resolving irrigation practices

**Project Components**

1. Carry out a pedological study of identified areas downstream favourable to irrigation in gravity systems
2. Feasibility study for three pilot plots to be irrigated using simple and sustainable methods has been done
3. Realisation of irrigation and development of the three plots (irrigation – drainage)
4. Follow up and evaluation of the project

**Expected Results**

- Identified areas are irrigated properly and are productive
- Beneficiary population are less vulnerable to climate change in those zones exposed to frequent droughts
- Grouped habitat and the creation of irrigation cooperatives are stimulated.

**Beneficiaries**

Farmers and pastoralists at the level areas located downstream perpetual rivers.

**IMPLEMENTATION****Implementing Agencies**

- Project coordination;
- MINITERE;
- MININFRA;
- Concerned districts;
- REMA.

**Follow-up and Evaluation**

Institution: Project coordination, pilot and steering committees, beneficiaries and donors

Frequency: Term and annual

Type: Physical and Financial

Methods: Report with performance indicators, seminars, field visit

**Risks and Barriers**

1. Attribution of favourable plots is complicated
2. Gravity irrigation through simple methods provokes important loss of water
3. Water flows in question gets reduced with time
4. Conflicts of utilisation appear with hydro electrical micro central projects

**Project Duration**

4 years

**Period**

2007-2011



**COST**

*USD 750.000*

# SAMOA

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## NAPA PRIORITY PROJECT 1

### PROJECT PROFILE 1: SECURING COMMUNITY WATER RESOURCES PROJECT

#### TO IMPROVE WATER QUALITY, ACCESSIBILITY AND AVAILABILITY (QUANTITY) OF COMMUNITIES

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The water resources of Samoa have encountered many disastrous and difficult situations as a direct result of climate change. Dry and drought periods result in water shortages while heavy rains bring flooding. Furthermore, sea level rise increases the possibilities of seawater intrusion into underground water aquifers. Extreme events such as cyclones and flash flooding have become prominent events, which have had major effects on the Samoa Water Authority's service. All these events tend to disrupt the service and result in major problems of deteriorating water quality.

The findings from the community consultations conducted by the Ministry of Natural Resources, Environment & Meteorology (MNREM) and the National Climate Change Country Team (NCCCT) during the preparation processes concluded that developing a set of adaptive activities in response to the vulnerability of water resource is of high importance to communities. Such activities would improve daily access and improve water quality and availability and help to minimize the impacts of climate change.

#### RATIONALE

Impacts of climate change and climate variability on Samoa cause unreliability of water resources. Samoa would be better adapted to respond to these impacts if improvements are made to water supply and accessibility.

Communities should not continue to rely on unpredictable and untreated river supply as there is not always alternative storage services provided (example, water tanks). Alternative sustainable methods need to be sought to enable Samoa to sustain the resource and ensure safe consumption whilst minimizing the spread of water borne diseases.

#### DESCRIPTION

##### Key Objectives

1. Ensure good water quality is kept at an optimum level;
2. Ensure that water is easily accessible by all communities including all facets of society;
3. Ensure that water is available and sustainable in all communities especially those that are most in need and are facing hardship due to water problems.

##### Expected Outcomes

- Availability and accessibility to good quality water in communities;
- Improved quality of water in communities;
- Sustainable supply of water in communities;
- Sustain water resources;
- Village community coastal springs well maintained and highly protected;
- Sustainability of water for at least 3 to 6 months of drought periods;
- Ability of communities to store enough supply of good quality water.

<b>Suggested Actions Required</b>	<b>Indicators / Expected Outputs</b>	<b>Potential Long Term Outcomes</b>
Develop water purification programs for communities	Community-based Water Purification Management Plans; Water Purification Technology Transfer	Availability and accessibility to good quality water in communities; Improved quality of water in communities;
Develop integrated watershed management programme with communities	District-based Watershed Management Plan & Strategies; Integrated Water Shed Management; Plans and Strategies for communities; Sustain and protected water resources	Sustainable supply of water; Improved quality of water; Sustained water resources.
Restore and protect coastal springs in the most vulnerable coastal communities	Community-based Coastal Spring Protection Program Plans.	Coastal springs well maintained and highly protected; Accessibility to clean and good quality water; Continuous supply of water in the communities.
Develop alternative water storage and water-use efficiency technology and programs in the communities	Existence of alternative water storage equipment and technology at end of project; Accessibility of alternative water storage equipment and technology transfer programs.	Sustainability of water for at least 3 to 6 months of drought periods; Ability of communities to store enough supply of good quality water

### IMPLEMENTATION

#### **Institutional Arrangement**

Implementing Agency: Samoa Water Authority (SWA)  
Coordinating Agency: Ministry of Natural Resources, Environment & Meteorology (MNREM)

The Samoa Water Authority (SWA), a government corporation, is the most suitable national agency to implement this project profile. It is proposed that SWA will undertake the identified activities in close collaboration with the communities that require urgent and immediate attention of their water resources.

The project will be coordinated by MNREM and evaluated and monitored by the National Climate Change Country Team Project Steering Committee. This Steering committee consists of executive level officers of each government ministry and private stakeholders who will oversee the articulation of funding received to implement these activities as well as other technical related matters.

#### **Risks and Barriers**

1. The SWA lacks the financial capacity to implement most of the future strategies which would otherwise assist in minimizing the effects of climate change;
2. Less recognition of water management and disaster in the National Disaster Management Plan
3. Lack of enforcement for existing regional and national plans and policies;
4. Lack of coordination and collaboration between various stakeholders who have a vested interest in proper water resource management;

5. No regulations that can control private extraction of groundwater either in customary land or privately owned lands;
6. Poor quality information on the availability and quantity of surface water and ground water.

#### Monitoring and Evaluation

- Evaluation and monitoring should be carried out on a regular basis particularly during the dry season (May to October);
- Village monitoring committees (VMC) working in close collaboration with Samoa Water Authority, the Ministry of Agriculture and MNREM;
- An independent evaluation assessment team is to be selected by the NCCCT steering committee.

#### COST

#### Indicative Budget

*Proposed Funding (Technical Assistance): USD 505,000*

Activity	Costs (USD)
Develop water purification programs for communities	120 500
Integrated watershed management programs	114 500
Restore coastal springs	120 000
Develop alternative storage programs & technology	150 000
<b>TOTAL</b>	<b>505 000</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. 5

### WATER AND ENERGY SECTORS PROJECT 1

#### CONSTRUCTION OF TWO SYSTEMS OF DRINKING WATER SUPPLY IN RURAL ZONES

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Location: S.Tomé and Prince Two rural systems

Sector: Water

#### JUSTIFICATION

Great part of santomense population doesn't have drinking water their houses. Some people have systems of holes even, without any appropriate treatment.

Given the easiness of finding courses of water as well as sources, small systems can be built with due treatment, also using renewable energies. Those systems can be managed by the own community properly organized.

#### DESCRIPTION

##### **General Objective**

To supply STP population with drinking water.

##### **Specific Objectives**

- To increase the amount of population covering of drinking water;
- To reduce the incidence of the diseases related with water;
- To contribute for the reduction of the infant mortality tax.

##### **Activities**

- Construction of systems of water supply with treatment;
- Installation of systems of treatment of water;
- Training of personnel;
- Sensitization of population;
- Creation and attendance of local structures.

##### **Contributions**

International organizations, NGOs

##### **Expect results**

Systems of water supply functional;

Poverty Reduction in the country, with incidence in the improvement of the conditions of the women's life;

Reduction of diseases related with water.

#### IMPLEMENTATION

##### **Institutional Framework**

Project to be executed by EMAE, autarchies, private sector,

##### **Risks and obstacles**

Storms, institutional Obstacles.

**Control**

DRNE, ministry of Health,

**Indicators**

Affected population

**COST***USD 1,000,000*

# SAO TOME E PRINCIPE

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NAPA PRIORITY PROJECT NO. 21  
WATER AND ENERGY SECTORS PROJECT 2  
EVALUATION AND PLANNING THE HYDRO RESOURCES

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Location: The whole country, Democratic Republic of S.Tomé and Príncipe  
Sector: Water

## JUSTIFICATION

STP has a high number of courses of water, having been formerly identified about 223 courses of water and 116 basins hydro-graphics, data that lack of an actualization in terms of the amount and quality, as could be verify in the inquiries. Relatively to the underground waters, measurements don't exist and they still didn't have any research rehearsals for a trustworthy evaluation of that resource. It is necessary that we know what we have to plan the use for the several needs, as they are the supply of drinking water, the supply of water for the agriculture, the livestock and the production of electrical energy, the use for industrial needs and of services rendered. Such knowledge also impose because of the effects of climate alterations in the process of water management in the country.

## DESCRIPTION

### Objectives

- To evaluate the readiness of the natural resources;
- To protect its quality;
- To plan its use;
- To develop national competences for the integrated management of the water resources;
- To institute a national system of management of water resources.

### Activities

Collect of existent information. Acquisition and nstallation of hydro-metric equipments, reinforcement of the attendance services and improvement of management, elaboration of codes, training and up dated for human resources, creation of a database and improvement of the knowledge on impact of climate changes in the water resources

### Contributions

State Santomense and international organizations

### Expected results

- Structures that allow researches hydrological and hydro-geologic properly installed and in operation;
- Implementation of a national system of information and of monitor relatively to the water resources;
- Elaborate and implement legislation and regulation, with practical modalities of application very defined;
- Institutionalization of management system, with the purpose of putting in practice the national politics of the water resources.

**Short term results**

Management improvement of the water resources.

**IMPLEMENTATION****Institutional Framework**

Implementation of local and regional structures that make possible the application of the politics in the whole country.

**Risks and obstacles**

Disastrous climate Factors, institutional Obstacles.

**Control**

Supervision of DRNE.

**Indicators**

- Elaboration of the Legislation;
- Rining and specialization of personnel;
- Hydro-metric equipments installed.

**COST**

*USD 400,000*



# SÉNÉGAL

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## NAPA PRIORITY PROGRAMME 2: UTILISATION RATIONNELLE DE L'EAU

### PROJET 1: REVITALISATION DU RÉSEAU HYDROGRAPHIQUE DES BAS-FONDS, MARES TEMPORAIRES ET LACS ARTIFICIELS EN APPUI AU PROGRAMME «BASSINS DE RÉTENTION»

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#### PROBLÉMATIQUES DE BASE

Le Sénégal dispose d'importantes potentialités en eau (aussi bien de surface que souterraine) qui sont en nette régression depuis les années 1970 du fait de la baisse continue des précipitations. Cette instabilité climatique a entraîné une importante baisse des nappes phréatiques et un assèchement des zones humides continentales qui leur sont associées. Dans les biefs maritimes cet infléchissement du potentiel des nappes d'eau souterraines est également à l'origine d'une profonde pénétration des eaux marines entraînant une salinisation des terres agricoles et des eaux douces.

Cette régression généralisée des ressources en eau douce a eu des impacts très négatifs notamment sur l'agriculture, l'élevage, l'approvisionnement en eau potable des populations ainsi que la conservation de la biodiversité qui constituent les maillons fondamentaux de l'économie rurale.

Toutes ces difficultés, qui ont pour origine la variabilité climatique actuelle, elle-même étroitement liée au réchauffement anthropique du globe, ont été relevés avec pertinence par les populations cibles et des solutions alternatives, envisagées lors des consultations publiques effectuées par l'équipe PANA en avril/mai 2005.

Ces consultations ont relevé l'urgence de la mise en place d'un plan de rétention des eaux pluviales dans les bas-fonds, mares temporaires et autres zones d'accumulation des eaux pluviales.

#### JUSTIFICATION DU PROJET

Dans l'ensemble, le Sénégal enregistre des précipitations appréciables allant de 200 mm au nord à plus de 1000 mm au sud (figure ci-dessous). Cependant, faute de retenues de stockage et d'aménagement des bassins versants, c'est plus de 150 milliards de m<sup>3</sup> d'eau qui ruissellent en mer par an, érodent et dégradent les terres de culture. Ce faisant, l'eau demeure le facteur limitant au développement rural pendant les 9 mois que dure la saison sèche.

Pour un développement durable des activités de production en milieu rural, la maîtrise des eaux de ruissellement par des actions de protection et de valorisation des bas-fonds et des zones d'accumulation d'eau pluviale devrait constituer une stratégie d'adaptation au problème de pertes d'eau qui constituent le principal frein au développement du pays. Cette stratégie tentée, ici et là, par les populations locales en vue de la conservation de l'eau dans leur terroir mérite l'appui de la communauté internationale dans le cadre des PANA. Elle viendrait en appui au programme, plus ambitieux, des bassins de rétention, initié, depuis l'année 2000, par le gouvernement sénégalais.

## OBJECTIFS DU PROJET

### Objectif de développement

L'objectif de développement du projet est l'optimisation du potentiel hydrique en milieu rural par la protection et l'organisation de la gestion des eaux, sols et forêts dans les zones d'accumulation d'eau y compris les bassins de rétention artificiels afin d'améliorer les conditions de production des populations rurales.

Le programme s'inscrit dans le plan global de préservation de l'environnement et se veut un modèle communautaire de développement en milieu rural.

### Objectifs spécifiques

Les objectifs spécifiques du programme stratégique sont:

- La recharge des nappes phréatiques afin de restaurer l'équilibre hydrodynamique et la pérennisation des écoulements de surface;
- La pérennisation des plans d'eau de surface (mise en disponibilité de l'eau au cours de la saison sèche);
- La restauration des écosystèmes humides et la protection de l'environnement;
- La protection des zones sensibles et la réhabilitation des zones dégradées;
- La lutte contre l'invasion marine dans les zones littorales;
- L'appui à la remise en place des organisations de producteurs ainsi que leur formation à la gestion des ressources des bassins versants afin de renforcer leur capacité d'adaptation aux effets adverses du climat.

La mise en place de terrasses progressives, de cordons pierreux et de fossés d'infiltration visant la recharge des nappes phréatiques et de la rétention des eaux et sols au niveau des bassins versants assurant la régénérescence rapide du couvert végétal et un écoulement retardé vers les zones d'accumulation et de rétention;

### Stratégie d'exécution

La mise en oeuvre de ce programme passe par:

- La mise en place de petites digues de rétention et de maintient des eaux pluviales dans les zones d'accumulation (bas-fonds, mares temporaires...);
- La prospection, la sélection des sites et l'exécution des études de bases par une équipe pluridisciplinaire;
- La réalisation par la méthode participative des travaux d'aménagement et de mise en valeur par les populations concernées encadrées par le projet et les ONG locales;
- Le suivi et la pérennisation des aménagements, par les populations appuyées par l'équipe pluridisciplinaire.

Cette stratégie d'exécution sera essentiellement basée sur l'usage de techniques locales telles que la mise en place de cordons pierreux (moellons, paille et branchages renforcés au niveau talwegs), de déversants couplés aux fossés anti-érosifs et au reboisement (fossés d'infiltration particuliers) ouverts selon la topographie.

Les exploitants seront organisés en groupements afin de réaliser, sous forme de travaux communautaires, les tâches qui leur seront confiées. Celles-ci seront essentiellement liées à la mise à disposition de la main d'oeuvre non spécialisée, des matériaux locaux (les terrains, sables, pierres, eau, graviers, ...).

Ils seront responsables de la gestion des activités au niveau villageois.

### Localisation du programme

Le projet de protection et de valorisation des zones d'accumulation des eaux pluviales (bas-fonds, mares temporelles...) et bassins de rétention artificiels concerne tous sites s'y prêtant à l'échelle du territoire national. La technologie à mettre en oeuvre sera à choisir en fonction de la nature du site et du matériau disponible à l'échelle locale ainsi que les contraintes du milieu. Typologie régionale des aménagements

La typologie des aménagements est fonction de celle du réseau hydrographique. A titre indicatif:

**Dans la zone nord** (Saint-Louis et Louga), où en dehors du bassin du fleuve, le réseau hydrographique est fossilisé, les aménagements porteront sur l'extension et la protection des lacs artificiels et les mares temporelles qui abondent dans le paysage.

**Dans la zone au centre du pays** où le réseau hydrographique est présent sous forme de vallées sèches avec une succession de zones inondables, les aménagements seront sur la convergence du ruissellement dans ces zones basses par l'aménagement de digues de retenue.

**Au sud du pays** où le réseau hydrographique se présente sous forme de larges bas-fonds, les aménagements devront porter sur les retenues collinaires et les endiguements anti-sel.

### FINANCEMENT DU PROGRAMME

*Total: USD 280,000*

Les besoins indicatifs en terme financier sont les suivants par site à aménager:

Activités	Coûts FCFA	Coûts USD
études de bases et d'exécution	30 Millions	60 000
travaux d'exécution	100 Millions	200 000
coordination, supervision et suivi du programme	10 Millions	20 000
Total	140 Millions	<b>280 000</b>

### Sources de Financement

FEM, Etat du Sénégal, Autres Organismes

### ORGANES DE MISE EN OEUVRE, D'EXÉCUTION ET DE SUIVI

- Ministères de l'Environnement et des Etablissements Classés (suivi);
- Ministères de l'Agriculture et de l'Hydraulique, (mise en oeuvre) ;
- Direction du Génie Rural, des Bassins de Rétention et Lacs Artificiels (DGRBRLA) (exécution) ;
- Université Cheikh Anta Diop et autres structures des recherches nationales (étude, suivi et formation) ;
- Organisation des producteurs, ONGs et tout autre acteur compétent (exécution, réalisation).

# SÉNÉGAL

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## NAPA PRIORITY PROGRAMME 2: UTILISATION RATIONNELLE DE L'EAU PROJET 2: PROMOTION DES TECHNIQUES DE GOUTTE À GOUTTE

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### JUSTIFICATION

L'eau constitue un facteur limitant pour le développement de l'agriculture. Or au Sénégal, la saison pluvieuse ne dure que trois mois sur l'étendue du territoire et plus de 70% de la population active est agriculteur. Pour permettre la création de revenus chez les paysans, durant la saison sèche, lutter contre l'exode rurale, la promotion des cultures de contre saison, comme le maraîchage est à soutenir cela avec le développement de l'irrigation.

### DESCRIPTION

#### **Activité 1: Promotion des techniques de goutte à goutte**

L'utilisation rationnelle de l'eau à travers la promotion de l'irrigation localisée est à développer. Il s'agira de procéder à une subvention dégressive des équipements nécessaires pour la mise en place du « family dropping system » ou système d'irrigation à pression zéro. Il sera introduit une centaine de Kits (60 petits kits et 40 grands kits) par an sur une durée de trois (3) ans, au niveau des petits exploitants dans les régions du Nord, du centre (bassin arachidier), dans les Niayes, à Thiés et Diourbel. L'économie de l'eau avec ce type de technologies est de l'ordre 30% à 50%; l'eau est ramenée à la racine de l'arbre et les produits fertilisants peuvent être introduits dans le système, favorisant une gestion rationnelle de l'eau. L'attribution des kits se fera sur la base de critères discriminatifs tels que (genre, la disponibilité de puits, de pompe, terre protégée etc.) Les kits seront subventionnés à hauteur de 50 % au cours de la première année et à 25% au cours de la deuxième année. Par ailleurs les artisans locaux seront formés pour la fabrication des kits. Une évaluation lors de la première année des acquis sera effectuée, elle prendra en considération le taux de pénétration et d'utilisation des kits et les rendements de production obtenus par les exploitants.

#### **Organes de mise en oeuvre et d'exécution**

- ISRA,
- Direction de l'horticulture
- ANCAR,
- Direction Régional du Développement Rural

#### **Les impacts**

- Réduction de la pression sur la nappe phréatique
- Atténuation du processus de salinisation des eaux (ralentissements de la montée du biseau salé)
- Amélioration des revenus des populations
- Amélioration de la qualité des produits cultivés
- Augmentation des rendements

- Réduction des intrants (engrais)
- Etalement de la production
- Economie de main d'oeuvre et d'énergie

#### Activité 2: Valorisation agricole des eaux usées

Au niveau des Niayes, il se pose une pression importante sur l'utilisation de l'eau liée à un besoin important croissant pour les exploitants maraîchers, la baisse de la nappe phréatique et la remontée du biseau salée. Le projet visera en sus de la promotion des Kits d'irrigation localisée, aux possibilités de réutilisation des eaux usées avec les structures concernées pour l'agriculture et la sylviculture dans la région de Dakar.

En effet, la station d'épuration de Cambéréne rejette entre 7 000 et 10 000m<sup>3</sup> d'eau traitée par jour, il s'agira de faire les études de faisabilité devant définir la meilleure manière de valoriser ces eaux usées traitées, notamment pour les maraîchers et de mettre en place les aménagements nécessaires.

#### COÛTS

*Total: USD 372,000*

		Année 1	Année 2	Année 3	Année 4	Année 5	Total FCFA	Total USD
Utilisation rationnelle des eaux	Petits kits x3	18 000 000	9 000 000				27 000 000	54 000
	Grands Kits x3	30 000 000	15 000 000				45 000 000	90 000
	Etudes et valorisation des eaux usées à Dakar	20 000 000					20 000 000	40 000
	Aménagements pour réutilisation agricole des eaux usées à Dakar		60 000 000				60 000 000	120 000
Coordination des activités	6 800 000	6 800 000	6 800 000	6 800 000	6 800 000	34 000 000	68 000	
<b>Total (FCFA)</b>	74 800 000	90 800 000	6 800 000	6 800 000	6 800 000	<b>196 000 000</b>		
<b>Total (USD)</b>							<b>372 000</b>	

#### Stratégie de pérennisation

La pérennisation des actions par déjà de la volonté de développer une stratégie de mise en oeuvre qui mette les populations et les techniciens des services décentralisés

et déconcentrées au coeur du dispositif. L'organisation des populations en comité de gestion des différentes infrastructures permettra à terme de réfléchir sur la meilleure manière de dégager des fonds pour la prise en charge des frais d'entretien et de rénovations. Pour finir, l'option des solutions à hauteur d'homme ainsi que la formation et la sensibilisation sont également des gages de durabilité.

# SIERRA LEONE

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## NAPA PRIORITY PROJECT NO 11 INSTITUTIONAL STRENGTHENING OF THE WATER RESOURCES SECTOR IN SIERRA LEONE

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### RATIONALE/JUSTIFICATION

The Water Resources Sector has played, and continues to play a crucial role in Sierra Leone's Development. Government, in collaboration with its local and international partners has invested huge capital in the water supply sector in the last two decades. Despite this massive injection of capital, the impacts this has created have been minimal, attributable to lack of coordinated research, monitoring, and control. A recent study, based on a multiple cluster indicator survey (UNICEF, 2003), indicates that on average only 22 % of the entire population of Sierra Leone has access to safe drinking water. The situation could deteriorate if changes in the hydrological regime following climate change happen more quickly than anticipated.

Water resources development has been slow and uncoordinated, with only three subsectors active in the implementation of major projects. The water supply sector has many players but too little services products. There has been a proliferation of urban and rural water supply projects, all aimed at reducing the proportion of people without access to safe and sustainable drinking water.

The development of water resources for hydroelectric power production is still in its infancy in the country with a single functioning plant located along the Dodo River, in the Kenema District. The Dodo scheme has a power output of 4 Megawatts, and serves the cities of Kenema and Bo in the east and south of the country, respectively. The first of four phases of the Bumbuna Hydroelectric Power project is nearing completion and is supposed to provide a total power output of 308 MW. When completed, this phase of the project would provide 50 Megawatts of electricity to the country's capital, Freetown, and other major towns in the northern region. Although there have been some achievements in this area, more has to be done in terms of research and monitoring.

Irrigation is yet to take off as a major water development activity in the country. However, the potential for irrigation remains high due to the dense network of permanent streams in the country.

The aim of the project is to strengthening existing institutions for effective management and control of water resources for sustainable development. The need to enhance human and institutional capacities is consistent with ensuring that realistic options aimed at minimizing the negative impacts of climate change are considered. The outcomes of the project would provide the impetus for government and other stakeholders to intensify efforts geared towards adapting successfully to climate change through monitoring and research.

### DESCRIPTION

#### Objective

The overarching objective of the project is to build capacity in the water resources sector through institutional strengthening with a view to ensuring the effective delivery of hydrological services, predicated on the realization that workable options

for adapting to climate change is consistent with collaborative research, monitoring, and efficient management of our finite resources.

#### **Activities**

The following activities will be undertaken:

- a) The setting up of a hydrological services unit with the express purpose of coordinating all water-related activities,
- b) Establishing regional resource centres for use by water managers and researchers,
- c) The installation of hydrometric and monitoring stations in the major river basins,
- d) Training of professionals on the measurement and monitoring of water-related impacts of climate change.

#### **Inputs**

The inputs required include financial resources, equipment, and technical expertise.

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

- All major rivers in the country will be equipped with gauges for measuring flow;
- Incidences of flooding will be forecast with sufficient accuracy;
- The methods of data collection will be unified;
- Hydrological services products will be effectively utilized by the user communities.

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

The user communities will benefit immensely from hydrological services products especially early warning signals of impending water-related disasters exacerbated by climate change.

### **IMPLEMENTATION**

#### **Institutional arrangements**

The Ministry of Energy and Power will be the lead implementing agency with oversight provided by local councils, national and international non-governmental organizations, civil society, and other stakeholders in the water resources sector.

#### **Risks and barriers**

- Vandalisation and accidental destruction of equipment in the river basins;
- Delay in the release of funds;
- Political instability;
- Compatibility of equipment with the local climate.

#### **Monitoring and evaluation**

The responsibility for monitoring will be borne by the relevant line ministries, while the Local Councils will evaluate the project. Both monitoring and evaluation shall be conducted according to the following schedules:

- Monthly narrative reports;
- Financial reports;
- Evaluation report of the local councils.



**COST**

*The estimated cost of the project is USD 2.25 million*

**Budget Breakdown**

<b>ACTIVITY</b>	<b>COSTS</b>		
	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Coordination/Recruitment of personnel	20 000	-	-
Training of managers, professionals, and technicians	200 000	100 000	100 000
Purchase of stream gauges and ancillary equipment	1 500 000	500 000	500 000
Installation and three year maintenance of equipment	50 000	25 000	30 000
Office equipment (Resource centre) and running cost for three years	100 000	50 000	75 000
<b>Total</b>	<b>1 870 000</b>	<b>675 000</b>	<b>705 000</b>

# SIERRA LEONE

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## NAPA PRIORITY PROJECT NO 12

### IMPROVEMENT OF THE EFFICIENCY OF EXISTING WATER SUPPLY SYSTEMS IN BOTH URBAN AND RURAL AREAS OF SIERRA LEONE.

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#### RATIONALE/JUSTIFICATION

Service delivery in the water resources sector in Sierra Leone is fraught with numerous constraints, not least the inefficiency of water supply systems. There is no reliable statistic on the amount of leakage taking place in piped water systems. However, guesstimates put the figure at 40 %, attributable to an ailing system designed in the 1960s.

The Guma Valley Water Company has the corporate responsibility of supplying treated pipe-borne surface water to residents in the capital, Freetown and its environs. Currently, the authority supplies 105 million gallons of water daily, which if accounted for will satisfy the drinking and other domestic requirements of about 90 % of consumers in the municipality. A rationing system now exists in which water is pumped into the distribution system at specific times during the day instead of the 24-hour service that the consumers were used to. Losses may be ascribed to leakage from old and damaged pipes that constitute the almost dilapidated network.

Rural water supply systems utilize groundwater abstracted from dug wells and boreholes distributed throughout Sierra Leone. The wastage experienced in groundwater supply systems is far less, both in frequency and in magnitude than in surface networks. Most public water supply systems that utilize groundwater make use of hand pumps as the water-lifting device.

This project aims at improving the efficiency of both rural and urban water supply systems by introducing measures geared towards reducing losses due to leakage from old and dilapidated networks as well as developing new pump designs for groundwater abstraction.

#### DESCRIPTION

##### **Objectives**

The objective of the project is to maximize the use of water resources for sustainable development by ensuring the efficient functioning of existing urban and rural water supply systems.

##### **Activities**

The activities will include:

- An inventory of existing water supply systems in both urban and rural settings;
- Identifying sources of leakage in piped networks and improving the methods of abstraction of groundwater in rural areas;
- Repair and/or reinstallation of water distribution networks;
- Installation of improved designs of hand pumps in existing protected wells;
- Water quality monitoring of surface and groundwater sources;
- Effective regulation of water supply activities.

### Inputs

The inputs include:

Financial resources, equipment, water supply hardware, and technical expertise.

### Short-term outputs

The short-term outputs include:

- Communities in target areas will receive more water from the systems for drinking and other domestic uses;
- There will be a drastic reduction in the incidences of water-related diseases such as cholera, dysentery and typhoid;
- The time saved by children in fetching water will be better utilized in school;
- Development will go on unhindered as more water will be available for running our industries.

### Potential long-term outputs

The proportion of people without access to safe and sustainable water supply and sanitation will be reduced significantly in line with the Millennium Development Goals.

It will also help water supply institutions generate more revenue needed for sustaining the schemes.

## IMPLEMENTATION

### Institutional Arrangements

The project will be implemented by the Ministry of Energy and Power in collaboration with other line ministries, with oversight being provided by the local councils in partnership with civil society and non-governmental organizations.

### Risks and Barriers

- Poor quality materials may be used;
- Delay in the disbursement of funds;
- Reinstallation of networks could have environmental impacts;
- Uncoordinated work involving different sectors could hinder project implementation.

### Monitoring and Evaluation

Monitoring will be done by the various line ministries while the local councils will evaluate the project through the following:

- Monthly reports;
- Financial reports;
- Evaluation of the project by the local councils and target beneficiaries.

## COST

*The estimated cost of the project is USD 2.95 Million*

### Budget Breakdown

ACTIVITY	COSTS		
	Year 1	Year 2	Year 3

Inventory of existing water supply systems	200 000	-	-
Rehabilitation of dilapidated network	500 000	500 000	500 000
Development of new pump designs	200 000	-	-
Supply of hand pumps	300 000	300 000	300 000
Sensitisation of user communities	50 000	50 000	50 000
<b>Total</b>	<b>1 250 000</b>	<b>850 000</b>	<b>850 000</b>

# SIERRA LEONE

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## NAPA PRIORITY PROJECT NO 13

### PROMOTION OF RAIN WATER HARVESTING AND DEVELOPMENT OF AN INTEGRATED MANAGEMENT SYSTEM FOR FRESH WATER BODIES

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#### RATIONALE/JUSTIFICATION

Sierra Leone is among the countries in the world with mean annual precipitation, in excess of 2000 mm. Despite this higher than global average figure, the timing of the rainfall suggests that water supply for various purposes could only be guaranteed for six months only, unless steps are taken to collect and store the available water. There is increasing realization that surface water systems are too expensive to manage, especially so when treatment is unavoidable. The sustainability of surface water systems is under serious threat due to lack of investment, exacerbated by climate change. There is therefore the need to maximize the collection, storage, and use of available precipitation by adopting more efficient and affordable technologies. Rainwater harvesting can provide a long-term solution to our domestic water needs.

The promotion of rainwater harvesting technology could be justified in light of its seeming simplicity and affordability. In rainwater harvesting, rainfall is captured by the roof of a building and diverted to a gutter from where it is channelled into a storage facility. The expansion of the city has necessitated an increase in the supply of water for commercial and domestic use. Rainwater harvesting would ensure that every household is able to collect and store sufficient water for domestic use.

The management of water resources for sustainable development requires an integrated approach. This project aims at promoting rainwater harvesting within the framework of an integrated water management system for fresh water bodies. Against the backdrop of acute shortage in both the rural and urban areas, users of water in the domestic and commercial sectors will be encouraged to utilize the cheaper option of rainwater harvesting to increase supply and therefore reduces demand.

#### DESCRIPTION

##### **Objectives**

The objective of the project is to increase water availability for domestic and commercial use through sensitization of communities about the possibility of capturing, storing and utilizing rainwater.

##### **Activities**

The activities will include:

- A nationwide sensitization on the need to adapt to a reduction in the availability of water following climate change, by capturing, storing, and utilizing rainwater for domestic and commercial use;
- Executing a pilot project aimed at demonstrating the technology of rainwater harvesting;
- Extension services to peri-urban and rural areas of the country;
- Installation of rainwater harvesting systems in hospitals and other key institutions.

### Inputs

The inputs include:

Financial resources, rainwater harvesting demonstration kit, and technical expertise.

### Short-term outputs

The short-term outputs include:

- Communities in target areas will be encouraged to practice rainwater harvesting, given its immense advantages;
- The practice of rainwater harvesting will see a drastic reduction in the incidences of water-related diseases such as cholera, dysentery and typhoid, much as rainwater is almost pathogen-free;
- The time saved by children in fetching water from public standpipes and wells will be better utilized in school;
- Development will go on unhindered as more water will be available for running our industries.

### Potential long-term outputs

Users of water will be able to access a variety of fresh water sources including the cheaper option of harvesting rainwater. The number of people without access to safe and sustainable water supply and sanitation will reduce significantly in line with the Millennium Development Goals. It will also help water supply institutions generate more revenue needed for sustaining the schemes.

## IMPLEMENTATION

### Institutional Arrangements

The Ministry of Energy and Power will be the key implementing agency in collaboration with other line ministries, with local councils providing oversight, in partnership with civil society and non-governmental organizations.

### Risks and Barriers

- Installation of the system might be costly and beyond the reach of most people;
- Poor quality materials may be used;
- Delay in the disbursement of funds;
- Utilisation of disused wells for storing rainwater could have environmental impacts;
- Uncoordinated work involving different sectors could hinder project implementation.

### Monitoring and Evaluation

The relevant line ministries will be in charge of monitoring while the local councils will evaluate the project through the following:

- Monthly narrative reports;
- Financial reports;
- Evaluation.

## COST

*The estimated cost of the project is USD 2.8 Million*

**Budget Breakdown**

<b>ACTIVITY</b>	<b>COSTS</b>		
	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
Sensitisation	50 000	-	-
Demonstration	500 000	250 000	100 000
Provision of rainwater harvesting facility in key institutions	1 000 000	500 000	400 000
<b>Total</b>	<b>1 550 000</b>	<b>750 000</b>	<b>500 000</b>

# TANZANIA

## NAPA PRIORITY PROJECT 2

### IMPROVING WATER AVAILABILITY TO DROUGHT-STRICKEN COMMUNITIES IN THE CENTRAL PART OF THE COUNTRY

#### JUSTIFICATION/RATIONALE

The government recognizes that water is an important component in the development of the country. This is proclaimed in various policies including: Vision 2025, the Poverty Reduction Strategy, the Agricultural Policy, the Environmental Policy, the Forestry Policy, and the Energy Policy. The Tanzania Poverty reduction strategy Paper recognizes the heavy dependence of the people on the environment (soil, water and forest).

Large areas of the country are water scarce areas and do not enjoy adequate supplies of water resources all year round. Rivers are dry half of the time in the larger part of the internal drainage basin. The high temporal and spatial variability in rainfall has resulted in endemic drought in some part of the country particularly the central regions. As a result these regions are frequently hit by extreme droughts posing a major challenge to water availability in these communities. This situation has led to frequent food insecurity and aggravated poverty in respective communities thereby increasing their vulnerability to the adverse impacts of climate change. Rainfall in these regions is very erratic, unimodal and unreliable. Recurrence of frequent drought in these areas has led to extreme weather events and rainfall has been reduced to a minimum of 400mm per year. The rainfall period is usually short and is followed by a long dry season of six to eight months. This is coupled with water scarcity problems as the little amount of water available in these regions is unsustainably utilized through poor and inefficient traditional irrigation practices, lack of storage facilities and degradation of water catchments by human activities.

In view of the above, the challenge of ensuring adequate availability of water for various uses in these regions remains very daunting. Interventions are needed in order to enable the communities to adapt and cope with the magnitude of water scarcity in the regions. It is against this background, interventions in this envisaged project are being proposed mainly to improve water availability in these communities for sustainable livelihood.

#### DESCRIPTION

##### **Overall objective**

To provide water and ensure sustainable utilization of water in the drought-stricken areas.

##### **Specific objectives**

- Ensure water availability to all communities in drought-stricken areas;
- Ensure sustainable use of available water;
- Ensure that communities participate in conservation and management of catchment's areas.

##### **Expected Outcomes**

- Improved water harvesting techniques and storage facilities;



- Well established water reservoirs and increased utilization of underground water sources;
- Improved sustainable utilization of water for various purposes;
- Increased participation of communities in conservation and management of water catchments.

#### Activities

- To establish water harvesting and storage techniques;
- To develop reservoirs and underground water abstraction;
- To promote community-based catchments conservation and management;
- To promote sustainable utilization of water in small-scale traditional irrigation practices.

### IMPLEMENTATION

#### Institutional arrangement for project implementation

The project will be implemented by Ministry of Water in collaboration with Prime Ministers Office- Regional Administration and local Government, Ministry of Natural Resources and Tourism, Ministry of Agriculture and Food Security, Ministry of Lands and Human Settlement Development, local communities and NGOs/CBOs.

### COST

#### Activity-Indicative Budget

*Total cost: USD 800,000*

S/N	Activity	Costs (USD)
1.	Promotion of water harvesting and storage techniques	200 000
2.	To develop reservoirs and underground water abstraction	300 000
3.	To promote community-based water catchments conservation and management	100 000
4.	To promote sustainable utilization of water in small-scale traditional irrigation practices	200 000
	GRAND TOTAL	800 000

# TANZANIA

## NAPA PRIORITY PROJECT 3

### SHIFTING OF SHALLOW WATER WELLS AFFECTED BY INUNDATION ON THE COASTAL REGIONS OF TANZANIA MAINLAND AND ZANZIBAR

#### RATIONALE/BACKGROUND

The five coastal regions of mainland Tanzania encompass about 15% of the country's land area and are home to approximately 25% of the country's population. Recent estimates indicate that the population of the five coastal regions now number about 8 million, with a growth rate ranging between two and six per cent. A doubling of the coastal population is expected in as little as twelve years. That could mean 16 million people will be living on the coastal areas by 2010, which is about 110 people per square kilometre.

Despite this huge number of the population on the coast, due to its potential aesthetic value and other unique natural resources which have attracted such a big number of people, coastal areas are most vulnerable to climate change due to the anticipated rise in sea level, floods and other consequences. Unfortunately, the effect of sea level rise is already being experienced in the Bagamoyo District of the Coast region. In this region sea level rise has resulted in inundation of some traditional water sources.

This process has resulted in salinization of shallow water wells, the only source of domestic water supply. As a consequence, the process has caused both social and economic problems associated with lack of reliable safe drinking water to rural communities.

These problems include:

- i. Women have to walk very long distances to fetch water. This consumes a lot of their time which could be spent on other productive activities. The burden is more on women and school children particularly girls who seem to be the main water courier; and
- ii. In some households, they have to set up a budget for buying water which is about USD 0.2 for 20 litres. Considering the poverty levels of these communities, normal African family of about 8 people, consumes the minimum amount of about 200 litres of water per day which is equivalent to USD 0.8. For a poor family living under USD 1 a day the budget for water is a challenge. As a result people are forced to avoid some productive activities such as animal keeping by zero grazing and farming of cash crops that needs irrigation.

Looking at this trend, there is an immediate need to take action to curb the situation, otherwise if unchecked; people living along the coast will be forced to migrate to other areas, something which may cause social conflicts and other environmental degradation due to overpopulation and utilization of resources. This will be impairing the targets of the Johannesburg Plan of Implementation (JPOI) especially the target to cut by half the population without reliable access to safe and clean drinking water by 2015; and the UN millennium Development Goals 1,2,3,4, 6 and 7 on poverty eradication, achieving universal education, gender equality, reducing child mortality and improving maternal health, combating diseases (water borne diseases in this case), and environmental sustainability respectively.

## DESCRIPTION

### Overall Objective

The overall objective of this project is to construct new water wells to enable people to have reliable access to safe and clean drinking water and for other development processes.

### Activities

- Awareness for the communities on the cause and impacts and exploration of their adjustments to the problems faced due to climate change impacts;
- Training on the sustainable use of water and methods of water harvesting;
- Conducting a survey to identify wells that have been inundated with sea water along the coast. The task of surveying wells will be conducted by the SSN adaptation team in Tanzania;
- Chemical testing of salts in wells that have been inundated with sea water to verify the extent of the problem. This task will be conducted by SSN Tanzania team in collaboration with other higher learning Institutions, particularly the University of Dar es Salaam;
- Survey of water source alternatives for communities that need new water sources; e.g. other places for bore holes or the possibility of gravity water supply. To achieve this task, water supply experts will be consulted and contracted;
- Rehabilitation of the traditional wells not yet inundated with sea water intrusion;
- Implementation of new water sources and supply. Bore holes drilling agents, and water supply companies will be consulted and contracted to complete the final stage of achieving adaptation goals;
- To reduce pressure on Coastal resources, promotion of alternative income generating opportunities;
- Promotion of good practice in land management.

### Short term output

- The communities at Bagamoyo District are able to express a basic understanding of current climate change impacts and adaptation options available;
- Shallow wells are relocated and new wells are being used;
- Shallow wells which have not been polluted are being used sustainably.

### Long term Output

This intervention will contribute to poverty reduction in the following ways:

- The coastal community will have reliable access to safe and clean drinking water and thus reduce their valuable time and energy spent on fetching water. This time will be devoted to other productive activities such as Small and medium Enterprises (SMEs), cultivation of cash crops, etc;
- Provide more time for school children to attend schools and acquire at least the universal primary education which is essential for every child;
- The cash spent on buying water will be used for other activities probably investing in Small and Medium Enterprises (SMEs);
- People will be able to grow and irrigate some small vegetable garden for extra income.

In general this intervention will compliment the efforts and objectives of the international communities especially the MDGs and the Johannesburg Plan of Implementation.

#### IMPLEMENTATION

##### **Institutional arrangements**

The project will be implemented under the leadership of the Ministry of Water in collaboration with Ministries of Natural Resources and Tourism, Ministry of Agriculture and Food Security, Local Government Authority, Local Communities, NGOs/CBOs.

#### COST

##### **Activity-Indicative Budget**

<i>Total cost: USD 3,300,000</i>
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Activity	Year 1 (USD)	Year 2 (USD)	Year 3 (USD)	Total (USD)
Project planning and appraisal	300 000			300 000
Facilitation of farmers	600 000	300 000	300 000	1 200 000
Establishment of tree nurseries	300 000	300 000	300 000	900 000
Establishing alternative income generating activities	300 000	300 000	300 000	900 000
<b>Total</b>	<b>1 500 000</b>	<b>900 000</b>	<b>900 000</b>	<b>3 300 000</b>

# TUVALU

## NAPA PRIORITY PROJECT 3

### ADAPTATION TO FREQUENT WATER SHORTAGES THROUGH INCREASING HOUSEHOLD WATER CAPACITY, WATER COLLECTION ACCESSORIES, AND WATER CONSERVATION TECHNIQUES

#### RATIONALE

In the past, Tuvalu has relied heavily on two reliable major sources of potable water; rain and groundwater sources. The latter has been polluted by the intrusion of saltwater due to sea level rise caused by climate change and household wastewater leachates. Dependence on the natural storage capacity of groundwater has been adversely affected by saltwater intrusion and will increase in future as reported in Tables 10 and 11 (of NAPA). However, increasing population and internal migration to urban areas and the increasing changes in climate and variability resulting in erratic rainfall pattern changes caused the water problem in Tuvalu – see Figure 6 (of NAPA).

Currently, Tuvalu depends entirely on rainwater collected and stored in tanks or cisterns as the main source of potable water for human consumption, and therefore, the need to increase household water storage capacity with water collecting accessories, including the enforcement of water conservation techniques are urgently needed for all stakeholders' and especially on low rainfall area Northern islands and highly populated (Funafuti) areas.

The status of the water resources in Tuvalu is briefly outlined in section 2.2.2 (of NAPA). Furthermore, Figure 6 (of NAPA) clearly defines that household storage facilities on Funafuti are insufficient. Therefore, increasing household water storage capacity with water collecting accessories and enforcement of water conservation techniques is the way forward to solving this water problem and for the people to easily access quality potable water.

#### DESCRIPTION

##### Goal

Adaptation to frequent water shortages through increasing household water capacity, water collection accessories, and water conservation technologies.

##### Objectives

There are two objectives for this project as follows:

- Increased household water storage capacity and water collecting accessories;
- Increased use of water conservation technologies.

<b>Outcomes:</b>	<b>Activities:</b>
1. Household water storage capacity increased	Activities will include: <ul style="list-style-type: none"> <li>• Training of Kaupule plumbers in fixing water collecting accessories and water storage structures;</li> <li>• Procurement of materials/water storage structures;</li> <li>• Distribution of water storage structures and water collecting devices.</li> </ul>
2. Water	Activities will include:

conservation techniques demonstrated	<ul style="list-style-type: none"> <li>• Conducting a Household water use survey;</li> <li>• Implementing water conservation technologies to minimize volume of water entering waste streams;</li> <li>• Training of Kaupule expert on water conservation technologies;</li> <li>• Public awareness.</li> </ul>
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#### Short-term outputs

- Insufficiency of household potable water reduced in project areas;
- Community access to quality water enhanced.

#### Potential long-term outcomes

- Household adaptation to drought and low rainfall periods improved;
- Improved family and community awareness in low rainfall periods and drought;
- Increased sustainable use of water resources at all levels of society;
- Decreased pollution of groundwater from human wastes.

### IMPLEMENTATION

#### Institutional arrangement

Primary implementing agency: PWD and Kaupule.

Secondary implementing agencies: DOE and NGOs/CBOs.

#### Risks and barriers

- Insufficient space for water storage structure installation;
- Land tenure problems for non-permanent households;
- Social acceptability of water conservation techniques.

#### Evaluation and monitoring

- Household water storage capacity increased;
- Wastewater reaching groundwater minimized;
- Improved Household Sanitary standard and health;
- Public Water Demand on government water resources decreased;
- Household resilience to drought and period of low rainfall increased.

### COST

The total cost for this project is:

<i>USD 2,675,300.00</i>
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#### Budget Breakdown

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

Activities	Year 1 (USD)	Year 2 (USD)
Training of Kaupule/community plumbers in fixing water collecting accessories and water storage structures	20 000	0
Procurement of materials/water storage structures	2 000 000	500 000

Distribution of water storage structures and water collecting devices	15 000	10 000
Conduct a Household water use survey.	500	15 000
Pilot water conservation technologies to reduce volume of water reaching the waste stream	10 000	10 000
Training of Kaupule expert on water conservation technology.	45 000	45 000
Public awareness.	3 000	1 000
Contingencies	400	400
<b>Sub-Total</b>	<b>2 093 900</b>	<b>581 400</b>
<b>Total Cost</b>		<b>2 675 300</b>

# UGANDA

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## NAPA PRIORITY PROJECT NO. 4 COMMUNITY WATER AND SANITATION PROJECT

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### JUSTIFICATION

In Uganda, the last few decades have seen an increase in the frequency and intensity of extreme weather events with serious socio-economic consequences. Increased frequency of heavy rains leading to floods and landslides, compounded by a poor sanitation system, pollution of water sources and damage to sanitation infrastructure has led to increased outbreaks of water borne diseases such as typhoid, cholera, bacillary dysentery and other water related diseases (e.g. malaria, bilharzias). For example, the 1997/98 El Nino phenomenon had a significant impact on the health sector. The cholera epidemic, first reported in October 1997 in Lolwe and Sigulu Islands of Bugiri District, hit Kampala City in early December and subsequently affected 39 districts. An estimated 41,857 were hospitalized, of whom 1,682 died. About 1,000 died in flood-related accidents and 150,000 displaced.

### DESCRIPTION

#### Objectives

- To increase access to safe water supply and improved sanitation among vulnerable communities in disaster prone areas;
- To strengthen community awareness on health impacts due to climate change;
- To strengthen emergency & disaster preparedness & response programmes.

#### Activities

- Sensitize communities on health impacts due to climate change;
- Establish emergency & disaster management plans and enhance strategic planning for disaster preparedness and response;
- Special assistance to vulnerable people;
- Relocate communities to safer areas/districts;
- Scale up poverty alleviation programmes and control population overgrowth through Family planning programmes;
- Formulating appropriate policies and strategies, legislation, standard;
- Enforce public health byelaws including public sensitization on relevant laws in health, environment and agriculture;
- Scale up hygiene and sanitation activities;
- improve on safe water supply through construction of more protected water sources and gravity flow schemes;
- Scale up preventive public health programmes including vector control e.g. mosquito control and management of malaria;
- Constitute food security programmes and plant multi -purpose trees for wind breaking, timber & fruits;
- Re-introduce herbal plants from other areas;
- Household Sanitation Promotion;
- Strengthen school Sanitation;
- Scaling up Food Safety and Hygiene;



- Strengthening Water Quality Surveillance;
- Scaling up Capacity Building Initiatives.

#### **Inputs**

- Funds from both Development Partners and Government of Uganda;
- Human Resources;
- Relevant logistics and equipment.

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

The expected achievements will include:

- National latrine coverage will have increased from 49% to 60%;
- The minimum environmental health services package.

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

- Improved health through reduction of water and sanitation related diseases;
- Improved and sustained socio-economic development for Uganda.

### **IMPLEMENTATION**

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

#### **Risks and Barriers**

- Inadequate funds;
- Natural hazards and disasters;
- Civil conflicts;
- Limited knowledge;
- Some communities have strong cultural resistance to assimilation / adaptation of new water and sanitation technologies.

#### **Monitoring and evaluation**

This important stage of project implementation will be a joint activity, involving the target communities and financiers. To facilitate the process a logical frame for the project will be constructed in which milestones of achievements and their objectively verifiable indicators will be clearly specified.

#### **Time Frame**

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

### **FINANCIAL RESOURCES**

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

*Estimated total project cost is USD 4,700,000*

# UGANDA

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## NAPA PRIORITY PROJECT NO. 5 WATER FOR PRODUCTION PROJECT

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### JUSTIFICATION

Agriculture is the mainstay of Uganda and is rain-fed. Subsequently, GoU aims at achieving agricultural modernization with high yielding species, varieties and breeds. These high yielding species usually require much more safe water throughout the year. However, increased climate variability and climate change will frustrate this initiative. Thus, providing appropriate water harvesting and irrigation technologies become pertinent. Therefore, access to improved water supply and sanitation for production by 2015 is crucial.

The IPCC Assessment Reports of 1995/2001 indicate that extreme weather events notably floods and droughts are to increase considerably in intensity and frequency. Floods and droughts have a negative impact on water resources. Floods pose a serious pollution of sources of drinking water with potential danger of outbreaks of water borne diseases. The large population of the rural poor and their livestock is most vulnerable to these effects given the fact that they are faced with inadequate access to water for production.

Therefore, attaining adequate access to and better use of water for crop and animal production is crucial. This is to be achieved in partnership with key stakeholders and community involvement. This also is in line with the national Poverty Eradication Action Plan (PEAP)

### DESCRIPTION

#### Objectives

To improve utilization of water resources among vulnerable communities for production

#### Activities

- Stakeholder analysis;
- Baseline surveys to identify constraints to water for production access in target communities;
- Develop and promote appropriate rainwater harvesting technologies;
- Develop and promote simple and low cost irrigation technologies;
- Construct, protect and maintain valley dams;
- Develop water reservoirs inside protected areas;
- Promote community involvement in planning, monitoring and evaluation;
- Promote best practices in water for production use and management;
- Identify and promote synergies;
- Develop and enforce byelaws for water for production.

#### Inputs

To implement the project a number of inputs are required. Tentatively the following inputs are envisaged: human resource of various professions, equipment and supplies, vehicles and logistical support. In puts for training of trainers in the use/ production of

water and sanitation technologies, construction works for safe water sources, drawing of guidelines on safe water use and sanitation and community training in water resources management will be required.

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

- Rain water harvesting demonstration units in strategic places;
- Appropriate irrigation demonstration units in strategic places;
- Communal valley dams constructed in arid and semi-arid areas;
- Increased availability and accessibility to safe water sources to vulnerable communities;
- Community with sufficient capacity in water resources management;
- Pamphlets on water for production use available and distributed to communities;
- Number of community-based production water sources established and managed by trained community-based technicians;
- Incentive-based enforcement of bylaws at community level;
- A number of community-based technicians trained and equipped in water and sanitation technologies.

#### **Long-term outputs**

- Increased availability and utilization of rain water for production in vulnerable communities;
- Increased crop and animal production and productivity;
- Improved animal health through reduction of water and sanitation related diseases.

### **IMPLEMENTATION**

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

#### **Risks and barriers**

- Inadequate funds;
- Natural hazards and disasters;
- Civil conflicts;
- Some communities have strong cultural resistance to assimilation / adaptation of new water and sanitation technologies;
- Water Resources Management is strange concept to the communities and it could be not well appreciated at community level;
- Limited knowledge of water harvesting.

#### **Monitoring and evaluation**

This important stage of project implementation will be a joint activity, involving the target communities and financiers. To facilitate the process a logical frame for the project will be constructed in which milestones of achievements and their objectively verifiable indicators will be clearly specified.

**Time Frame**

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

**FINANCIAL RESOURCES**

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

*Estimated total project cost is USD 5,000,000*

# VANUATU

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## NAPA PRIORITY PROJECT 1

### PROJECT CONCEPT 1. INTEGRATED WATER RESOURCE MANAGEMENT

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#### DESCRIPTION

##### **Project Goal**

Enhanced resilience of watershed through integrated water resource management.

##### **Project Objectives**

The objective of the project is to reduce vulnerability to the anticipated impacts from climate change on the country's water resources, with a primary focus on watershed areas. Specifically, the project seeks to identify national policies to address the impacts of climate change on water resources at the national level and to specifically formulate and implement pilot adaptation actions and specific measures in representative systems in order to protect their environmental functions and their rich biodiversity from climate change related impacts.

The project's goal is to enhance capacity to cope with projected climate change and climate variability in the watershed areas of Vanuatu. This will be achieved by the following strategies/activities.

- Assess the vulnerability and adaptive capacity of upland farmers and local institutions to climate change;
- Build resilience of upland farmers to the impacts of climate change by developing sustainable livelihoods (eg diversified farming; agroforestry; conservation farming);
- Integrate climate change risks in protected area and watershed planning;
- Develop a watershed-based early warning and monitoring system for climate phenomena such as ENSO;
- Build capacity of government and civil society organizations in coping with climate change.

##### **Expected Outcomes and Expected Outputs to Achieve Outcomes**

The project's main goal to enhance capacity of local stakeholders and institutions in Vanuatu's watersheds to cope with climate variability and climate change will be attained by the specific objectives, outcomes and outputs outlined below.

##### **Objective**

To develop and pilot strategies for building resilience of farmers to the impacts of climate change and climate variability.

##### **Outcome 1**

Sustainable livelihoods practices in pilot sites enhance resilience of farmers to cope with climate change and climate variability.

**Output 1.1:** Database containing hydro-climatic and socio-economic information

**Output 1.2:** Current coping mechanisms

**Output 1.3:** Livelihood options (eg diversified farming; agro-forestry; conservation farming) to enhance resilience identified.

**Output 1.4:** Enhanced capacity of government and civil society organizations to cope with climate change

#### Outcome 2

Early warning and monitoring systems provide timely and relevant information to assist farmers cope with climate variability.

**Output 2.1:** Integrated watershed management information system

**Output 2.2:** Training provided in use of climate information

**Output 2.3:** Stakeholder network established to enhance interaction

#### Outcome 3

Climate change risks, preparedness and mitigation integrated in protected area and watershed planning.

**Output 3.1:** Stakeholders (government, NGOs, private sector) trained to mainstream climate risks.

**Output 3.2:** Watershed management plans developed and enhanced

**Output 3.3:** Guidelines for mainstreaming adaptation

#### Outcome 4

Community's awareness of climate change and variability issues enhanced leading to successful replication of coping strategies in other areas.

**Output 4.1:** Best practices and lessons learned documented and disseminated widely using the media.

**Output 4.2:** Climate issues integrated into current agriculture and forestry activities.

**Output 4.2:** Community organizations strengthened.

#### Outcome 5

Developing mechanisms to promote sustainable land-use patterns that maintain the functional integrity of watershed areas. Promoting the sustainable use for watersheds and keeping the environmental and ecosystem services for native and migratory species as well as sustainable economical activities tuned to the specific characteristics on each area.

It is expected that the results of the project could be more widely replicated in other watersheds areas in the Vanuatu. The country is high volcanic with large mountains and hills, with many farmers cultivating rainfed sloping areas.

#### RATIONALE

According to the PAA approximately 80% of the population have access to improved water services (reticulated supply and rainwater catchment tanks) and over 80% of the population have improved sanitation. Moreover, most of the programmes that are currently implemented in the water sector focus mainly on getting water to the people but not addressing issues such as deforestation in the watershed area, encroachment of agriculture into the watershed and coastal areas.

#### IMPLEMENTATION ARRANGEMENTS

The project will be implemented by the Departments of Geology, Mines and Water Resources and Agriculture, working closely with the Departments of Forestry, Lands and Environment, with NACCC acting as the Advisory Committee.

**BUDGET**

A proposal for **USD 1m** will be developed for GEF funding, and will be allocated according to the activities and outcomes, to be determined during the project development phase.

# ZAMBIA

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## NAPA PRIORITY PROJECT =7

### APPENDIX II: NAPA OPTION 7

#### MAINTENANCE AND PROVISION OF WATER INFRASTRUCTURE TO COMMUNITIES TO REDUCE HUMAN-WILDLIFE CONFLICT

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##### RATIONALE/JUSTIFICATION

It was noted that there was need for integrated land management to ensure that watershed areas were not at risk to tree felling (for charcoal or firewood), that rivers and fisheries resources were protected and landscapes were preserved to support wildlife habitats. In extreme drought situations, animals and people come head-to-head competing for available water resource. The maintenance and expansion of existing water infrastructures in communities around parks will ensure the provision of access to potable water for communities living in and around protected areas. This will contribute to the reduction of human-wildlife-conflicts.

Further discussions identified three sources of risk associated with land management and invariably to wildlife management, namely:

- Poverty and hunger – especially reflected in food insecurity of communities living in and around the Game Management Areas;
- Lack of wage income – or alternative sources of livelihoods to subsistence farming;
- Heightened potential for Human-Wildlife Conflict (HWC) when droughts/floods affect these regions and their communities.

##### DESCRIPTION

###### **Overall Objective**

To provide access to potable water for communities living in and around protected areas.

###### **Activities**

Sinking boreholes and repairing existing water infrastructures in communities around parks.

###### **Short-Term Outputs**

Number of communities having access to potable water supplies.

###### **Potential Long-Term Outputs/Outcomes**

Number of boreholes sunk and water facilities repaired.

##### IMPLEMENTATION

###### **Institutional Arrangement**

ZAWA, Department of Water Affairs - Communities.

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

Access to water facilities at the moment is problematic.



COST

*USD 75,000*