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GEF Least Developed Countries Fund



The Least Developed Country Fund

helping the poorest countries adapt to climate change

- | | |
|------------------------------------|-----------------------------|
| Afghanistan | Madagascar |
| Angola | Maldives |
| Bangladesh * | Mali |
| Benin * | Malawi * |
| Bhutan * | Mauritania * |
| Burkina Faso * | Mozambique |
| Burundi | Myanmar |
| Cambodia * | Nepal |
| Cape Verde * | Niger * |
| Central African Republic | Rwanda |
| Chad | Samoa * |
| Comoros | São Tomé and Príncipe |
| Democratic Republic of the Congo * | Senegal |
| Djibouti * | Sierra Leone * |
| Equatorial Guinea | Solomon Islands |
| Ethiopia | Somalia |
| Eritrea * | Sudan * |
| Gambia * | Timor-Lesté |
| Guinea | Togo |
| Guinea-Bissau | Tuvalu * |
| Haiti * | Uganda |
| Kiribati | United Republic of Tanzania |
| Lao People's Democratic Republic | Vanuatu |
| Lesotho | Yemen |
| Liberia | Zambia * |

* Denotes GEF LDCF project country



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by GEF.

THE LEAST DEVELOPED COUNTRIES FUND (LDCF)

The Least Developed Countries Fund (LDCF) was established under the United Nations Framework Convention on Climate Change (UNFCCC) at its seventh session in Marrakech and is managed by the Global Environment Facility (GEF). The fund addresses the special needs of the 48 Least Developed Countries (LDCs), which are especially vulnerable to the adverse impacts of climate change. This includes preparing and implementing National Adaptation Programmes of Action (NAPAs) to identify urgent and immediate needs of LDCs to adapt to climate change.

- (i) The GEF has so far mobilized voluntary contributions of about \$172 million for the LDCF; its target in the next 4 years is to reach \$500 million, which is the amount estimated by the UNFCCC needed to finance NAPA implementation.¹

THE NATIONAL ADAPTATION PROGRAMMES OF ACTION (NAPAS)

The rationale for developing NAPAs rests on the high vulnerability and low adaptive capacity of LDCs: many of which count among them some of the world's poorest. This demands in turn the need of immediate and urgent support for projects that allow for the adaptation to the adverse effects of climate change. Activities proposed through the NAPAs are those whose further delay could increase vulnerability, or lead to increased costs at a later stage. Therefore NAPAs are aimed

at identifying priority activities that address these urgent needs and concerns. Annotated Guidelines,² developed by the Least Developed Countries Expert Group (LEG) are a tool that may be used to prepare a NAPA.

FIRST STEP: NAPA PREPARATION

- Inter-disciplinary and multi-ministerial process aimed at addressing the adverse impacts of climate change
- Identification of “urgent and immediate needs” of the LDCs, according to specific guidelines provided by the Least Developed Countries Expert Group (LEG)
- Mobilization of resources by GEF to finance the preparation of NAPAs.

To date, the GEF has supported the preparation of 48 NAPAs.

These include the following countries which have completed their NAPAs: Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea Bissau, Haiti, Kiribati, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Niger, Rwanda, Samoa, Sao Tomé and Principe, Senegal, Sierra Leone, Sudan, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu and Zambia.

¹ Decision 7/CP.7, paragraph 6.

² Decision 28/CP.7, Annotated guidelines for the preparation of NAPAs

In addition, six NAPAs are in the final stages of preparation and are expected to be completed before the Spring 2009 Council meeting. Finally, four NAPA proposals (Angola, Myanmar, Nepal and Timor-Leste) were approved during the second half of 2007 and first half of 2008, and are expected to be completed before the end of 2009. All completed NAPAs can be accessed through the UNFCCC website <http://unfccc.int>.

SECOND STEP: NAPA IMPLEMENTATION

- Mobilization of resources to finance concrete projects on the ground for the implementation of NAPAs
- NAPA follow up project preparation and submission
- Project approval
- Project implementation
- Project monitoring and evaluation

Based on LDC feedback and consultations, the GEF developed a streamlined project cycle and simplified procedures rules to allow LDCs to more easily access LDCF resources. The GEF has so far mobilized \$172 million to implement NAPA follow up projects and the response of the LDCs has been remarkable. As of fall

2008, twenty-four countries have officially submitted their NAPA implementation projects under the LDCF.

Among these project proposals, nineteen have already been approved as consistent with the LDCF eligibility criteria in the following countries: Bangladesh, Benin, Bhutan, Burkina Faso, Cambodia, Cape Verde, Democratic Republic of the Congo, Djibouti, Eritrea, Gambia, Haiti, Malawi, Mauritania, Niger, Samoa, Sierra Leone, Sudan, Tuvalu, and Zambia.

So far, \$57 million have been authorised for concrete action in these LDCs. And these first results have been very encouraging: they show that the LDCs, despite their small economies and limited institutional and technical capacities, are now among the most advanced in the world with respect to cutting edge actions to reduce vulnerability and increase adaptive capacity to the adverse impacts of climate change.

Building on this example, the evolving financial architecture of climate change is continuing to draw inspiration from the pioneering work of the LDCF, now an established system with a proven track record and an ongoing commitment to its LDC clients.

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BANGLADESH

COMMUNITY-BASED ADAPTATION TO CLIMATE CHANGE THROUGH COASTAL AFFORESTATION IN BANGLADESH

LDCF project grant: \$3,300,000
Co-financing: \$7,100,000,
NAPA completion date: November 2005
Inclusion into LDCF Work Program:
September 2007
CEO endorsement date: October 2008
Implementation start: November 2008
(expected)

Bangladesh is one of the most vulnerable countries to the impact of climate change. According to the NAPA findings in Bangladesh, and supported by numerous other scientific-based assessments, the primary anticipated impacts as a result of projected climate change, including variability, range from increased saline water intrusion and inundation of coastal lands. Key risks identified include drainage congestion, reduced freshwater availability, disturbance of morphologic processes, and increased intensity of flooding. These key risks are classified as arising from a) gradual long-term climate change, and/or b) changes in the frequency and intensity of extreme events (climate variability).

In addition to placing coastal communities at higher risk, these projected changes will affect the development potential of coastal regions in Bangladesh. Exposure to climate risks will be pronounced for several reasons. According to estimates by a World Bank assessment of climate change impacts in Bangladesh, a small

change in peak discharge may result in about 20 per cent increase in the area flooded. Similarly, riverbank erosion is exponentially related to maximum flood levels. There is also low awareness and lack of capacity, including mechanisms to respond to anticipated impacts. Building resilience requires changes in attitude and strategic institutional arrangements, for example in terms of integrated planning and management that incorporate the risk posed by climate change, including variability. At the same time, coastal development in Bangladesh has been sub-optimal for both climate- and non-climatic reasons.

On the one hand, vulnerability has increased due to anthropogenic activities, particularly due to massive conversion of mangroves into commercial shrimp farms and fuel-wood demands (e.g. where mangroves are exploited for fisheries) which has reduced mangrove cover that otherwise function as a natural protective barrier to coastline erosion. Along coastlines, salt making industries and sand mining activities have led to the shifting and/or degradation of coastal sand dunes thereby undermining their effectiveness as physical barriers against flooding, and also as sedimentary stocks allowing for beach reorganization. The continuous increase in soil and water salinity due to receding coastlines as a result of unauthorised settlements is also contributing to the further degradation of natural defences.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The objective of the **Community-based Adaptation to Climate Change through Coastal Afforestation in Bangladesh** project is to reduce vulnerability of coastal communities to the impacts of climate change-induced risks in four upazilas in the coastal districts of Barguna and Patuakhali (Western Region), Bhola (Central Region), Noakhali (Central Region), and Chittagong (Eastern Region). The project will implement effective community-based adaptation measures in coastal areas that reduce vulnerability and improve adaptive capacity to climate change and sea level rise. The project will use demonstration measures aligned with local conditions, which will encompass community-based systems for the management of protective ecosystems, sustainable use of climate-sensitive natural resources and diversification of vulnerable livelihoods. The project outcomes will include a) Enhanced Resilience of Vulnerable Communities and Protective Systems to Climate Risks, b) Climate Risk Reduction Measures incorporated into Coastal Area Management Frameworks and c) National Policies Revised to Increase Climate Risk Resilience of Coastal Communities.

The project will use demonstration measures aligned with local conditions, which will encom-

pass community-based systems for the management of protective ecosystems, sustainable use of climate-sensitive natural resources and diversification of vulnerable livelihoods. Envisaged demonstration projects will focus on opportunities for community-based afforestation, mangrove regeneration and plantation management, erosion prevention and participative protection of coastal sediment barriers, reduction of man-made stresses on coral reefs and protective ecosystems, diversification of crops and agricultural practices, optimisation of freshwater and irrigation management, and improved information flows in climate information and early warning systems.

The project will also enable a strategic revision of national and sub-national policies and programs to incorporate climate change risk considerations and adaptation strategies into financial decision processes, and to develop coordination and harmonization amongst different sectoral interventions. The project will enhance the adaptive capacity of local communities to anticipate dynamic climate-related threats and protect their livelihoods, as well as improving the Individual, institutional and systemic capacity at all levels of public administration to plan for and respond to climate change risks in coastal areas.

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BENIN

INTEGRATED ADAPTATION PROGRAMME TO COMBAT THE EFFECTS OF CLIMATE CHANGE ON AGRICULTURAL PRODUCTION AND FOOD SECURITY

LDCF project grant: \$3,100,000

Co-financing: \$6,920,000

NAPA completion date: January 2008

**Inclusion into LDCF Work Program:
August 2008**

**CEO endorsement date: June 2009
(expected)**

**Implementation start: August 2009
(expected)**

With agriculture employing approximately 70% of the active population and contributing up to 36% of the national GDP and 88% of export earnings, the Beninese economy and general welfare is heavily dependent on agriculture, and therefore ultimately on the natural resource base available for agriculture. Benin's agricultural sector is generally considered to have a very low adaptive capacity for reasons linked to structural factors (high level of poverty among rural populations, weak mechanization and intensification of production modes), but also because of natural constraints (poor management of water and soils, leading to soil degradation).

Various climate scenarios have revealed climatic changes that could have a severely negative impact on the agricultural sector and consequently on the country's food security. These include, inter alia: a) reduced precipitation on the order of 20–30% at the national level, which translates into a 40–60% reduction in the availability of water resources; and b) an increase in events of violent and intense rains (frequently of

100 mm/h), potentially leading to increased flooding and erosion of poorly protected soils, with important losses of productive potential. It is highly probable that these changes will cause degraded conditions for agricultural production, as well as decreased and greater fluctuating agricultural yields. The national food situation runs a high risk of further deterioration, posing long-term threats to the progress accomplished so far in the agricultural area and to the achievement of the MDGs in Benin.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The heavy floods that seriously affected Benin in 2007 highlighted the country's weak capacity in the area of climate risk prevention, and have revealed some of the most apparent obstacles to implementing an effective adaptation policy in the agricultural sector. Among these, several specific adaptation barriers must be underscored: institutional (structural weakness of the climate change committee); technical (insufficient qualified human resources within the meteorological and agricultural services); cultural (cultural and social resistance to adopting new technologies or adaptive strategies when confronted with climate risks that have been deemed harmful); or economic (measures involving an additional financial cost on the part of the producers).

This project addresses these barriers through two-pronged strategy, which includes: a) general systemic, institutional and technical capacity building for forecasting, assessing and managing the impacts

of climate change and variability on the agricultural sector, and b) implementation of practical on-the-ground pilot activities to facilitate practical experience on how agricultural development can be made more resilient to the impacts of climate change.

The first leg of this strategy addresses the above capacity gaps and builds the necessary systemic, institutional and individual capacity to implement climate risk management at all levels. First of all, the project supports the integration of adaptation considerations and practices into relevant sectoral policy-making and planning processes. Similarly, Communal Development Plans along with local land management plans are being screened for climate risks and will be updated in light of the additional risks brought about by climate change in Benin's agricultural areas. This exercise enables an overall assessment of the costs of climate change and adaptation in the agriculture sector and provides the economic and technical justification for allocating national budgets to provide for managing climate change risks in agriculture. Secondly, LDCF support is utilized to improve the quality and timeliness of the climate information in support of climate adaptation decisions.

The project, therefore, provides technical assistance to ensure that baseline activities for upgrading the national meteorological services take sufficiently account of the new patterns of risks associated with increased climate variability. Project funds is also used to improve information flows between climate monitoring, forecasting and early warning services to policy-makers and farmer communities in high-risk areas. Finally, in the longer-term vision, the project takes various actions to build the capacities of the technical staff (technical departments, extension services, etc.) and of local farmers in preventing and controlling CC impacts on agriculture. To this end, training programs are developed and conducted. Moreover, climate change adaptation and risks management modules are integrated into the education programmes and curricula of national and local agricultural training institutes (professional and academic).

The second leg of the strategy involves setting up pilot activities to assist Benin's agriculture sector to make the transition towards climate resilience. These pilot activities includes: a) setting up a network for production and diffusion of short-cycle rice and maize crop varieties; b) developing climate change vulnerability maps and agricultural risk maps in the project zones; and c) Testing and disseminating climate-resilient agricultural practices (including improved soil and water management, adjusted crop rotation and crop calendars, drought tolerant fodder systems, increased food and seed storage capacities, etc.).

SYNERGIES AND COORDINATION

The LDCF intervention is coordinated with other initiatives to address climate change being implemented by GTZ (institutional support within the implementation framework of the UNFCCC) and Denmark. Also, the project is being coordinated with the following agricultural programmes and projects to assure maximum impact: a) Program to Support Rural Economic Growth (PACER) funded by Japan and the African Development Bank; b) a project managed by the IDID-ONG (Initiatives for Integrated and Sustainable Development), which aims to make agro-climatic information available to a number of farmers as an experiment to accompany agricultural activities; c) a project to develop drylands backed by the UNDP Drylands Development Center set up in Benin's dry areas; d) the NERICA rice promotion activities that seek to reduce the activity of climate impacts on rice through strengthening capacities in the WARDA Center (West African Rice Development Association); e) A National Food Security Office (ONASA) support programme for accumulating buffer stocks of food products, specifically maize and sorghum in production zones that have freed up marketed surplus; and f) A government emergency food-security support program that involves the activation of 1800 agriculture professionals in view of averting the specter of the food crisis that was triggered by the price surge for basic food products.

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BHUTAN

REDUCE CLIMATE CHANGE-INDUCED RISKS AND VULNERABILITIES FROM GLACIAL LAKE OUTBURSTS IN THE PUNAKHA-WANGDI AND CHAMKAR VALLEYS

LDCF project grant: \$3,445,050

Co-financing: \$4,036,224

NAPA completion date: May 2006

**Inclusion into LDCF Work Program:
October 2007**

CEO endorsement date: March 2008

Implementation start: March 2008

Bhutan experiences a number of natural hazards annually, including climate-induced disasters such as landslides and floods, which result in extensive damage. Climate change is likely to further exacerbate some of the natural hazards to which Bhutan is prone and lead to significant additional impacts (either in terms of severity or frequency) on the country's development pathway. A majority of Bhutan's population and infrastructure development is concentrated in large river valleys. The economy is highly dependent on hydropower resources, with revenue from hydropower export to India constituting 45% of the country's revenue. A major, climate-induced natural disaster could cause great human and economic devastation.

Of the natural hazards to which Bhutan is prone, none is more significant than that of climate change impacts on glaciers. Bhutan's entire northern upper land has glacier/snow-fed lakes in the mountaintops. Rising mean temperature, attributed by the scientific community to climate change, is the main cause of glacial retreat.

Recent studies suggest the rate of glacial retreat in the Himalayas is as high as 30 to 60 metres per decade. The melting of glaciers is leading to the volumes of water in downstream glacial lakes increasing at an alarmingly rapid rate. The concern is that when the current holding capacity of the lakes reaches a critical threshold, loose glacial debris that act as dams or barriers could fail and lead to flash floods that result in severe adverse impacts on downstream communities

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The objective of the project is to reduce climate change-induced risks and vulnerabilities from glacial lake outbursts in the Punakha-Wangdi Valley and Chamkhar Valleys. The project will integrate climate risk projections into existing disaster risk management practices and implement corresponding capacity development measures. The project will implement demonstrative and practical measures for reducing climate change-induced GLOF risks from the potentially dangerous Thorthormi glacier lake.

The lessons learned will facilitate replication in other high risk GLOF areas, both within and outside Bhutan. Complementary to this demonstration, the project will ensure that the existing early warning system in the Punakha-Wangdi Valley, which is not equipped to handle the full extent of potential GLOF risks, is expanded to incorporate coverage this growing risk. Lessons learned from

this initiative will enable up-scaling of early warning systems in other disaster-prone areas downstream of potentially hazardous glacier lakes.

At the national level, the expected adaptation benefits include improved government capacity to deal with dynamic, climate-induced hazards

and to design, implement, evaluate and replicate systems for GLOF risk reduction and preparedness. Vulnerability of communities in high risk GLOF areas will be reduced as the project will catalyze cost-effective management of glacier lake levels and adjustment of communal early-warning systems to climate change-induced hazards.

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BURKINA FASO

STRENGTHENING ADAPTATION CAPACITIES AND REDUCING THE VULNERABILITY TO CLIMATE CHANGE

LDCF project grant: \$2,900,000

Co-financing: \$6,300,000

NAPA completion date: December, 2007

**Inclusion into LDCF Work Program:
May 2008**

**CEO endorsement date: February, 2009
(expected)**

**Implementation start: May 2009
(expected)**

Being located mostly in the already dry Sahelo-Soudanian climatic zone, Burkina Faso is extremely vulnerable to the impacts of climate change. Two major long-term risks have been identified, including: a) the reduction of annual rainfall by -3.4% (2025) to -7.3% (2050) (this includes the reduction of precipitation levels by 20-30% (by 2050) between July and September, which are key months for crop growth); and b) the increase of average temperature by 0.8° C (2025) to 1.7° C (2050). Despite a number of autonomous measures to overcome current climate pressures, anticipated climate change is likely to compound problems facing the sector even further. Given the dominance of the agriculture sector, with 86% of the working population engaged in pastoral and agro-forestry activities, and accounting for 40% of the national GDP, adaptation is of paramount importance to Burkina Faso.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

This LDCF project, therefore, implements interventions that reduce the vulnerability of communities and food-production systems in Burkina Faso threatened by changes in mean climatic conditions and climatic variability. These interventions includes two main subthemes: a) improving systemic, institutional and individual capacity to respond to climate change in the agricultural sector; b) demonstrating best practices in climate resilient agro-pastoral production for sustainable improvement of food security, thereby fostering, capacity building, policy revisions and c) upscaling at the national level.

The first subtheme ensures that key national agriculture and water policies fully reflect anticipated climate change risks, that policy changes take effect to deliver vulnerability-reduction benefits in context of emerging climate risks, that institutional arrangements for supporting early-warning on climate induced food shortages is improved, and that communication plans on up-dated climate change-induced risks is improved. These interventions will be informed by, and fully linked to, the community level pilot adaptation measures described below.

The second subtheme is, based on existing initiatives to support agricultural intensification and diversification, and land and water conser-

vation measures, focused on piloting a range of adaptation measures at the community level including climate resilient irrigation approaches, developing livestock feed (forage and agro-industrial feedstuff) storage facilities in the center region, improving the resilience of forage facilities and developing improved food reserve facilities (including management practices) taking into account climate change risks. With this range of pilot demonstration activities, the project facilitates learning and replication, which can be supported through adjustments in policy and institutional support structures, as mentioned above.

SYNERGIES AND COORDINATION

The project closely interacts with the following programmes currently under implementation in Burkina Faso: a) the Project Livestock Development of Liptako Gourma; b) program for water resources valorization, c) Danish support program to the development of agriculture, d) a project for the fight against the silting/stranding of the Niger river basin, e) Support Local Development Project of Comoé-Léraba-KénéDougou; f) a project on natural resources management.

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CAMBODIA

BUILDING CAPACITIES TO INTEGRATE WATER RESOURCES PLANNING IN AGRICULTURAL DEVELOPMENT

LDCF project grant: \$1,850,000

Co-financing: \$1,950,000

NAPA completion date: March 2007

**Inclusion into LDCF Work Program:
January 2008**

**CEO endorsement date: January 2009
(Expected)**

**Implementation start: March 2009
(Expected)**

The project will increase adaptive capacity of key stakeholders in water resource management to address the impacts of climate change. The project has a particular focus on water resource needs of the agriculture sector. The project will identify, prioritize and drive needed policy reforms necessary to overcome constraints to the design, planning and implementation of technically and economically feasible measures on adaptation to climate change in the agricultural sector.

Interventions supported by this project will focus on the needs of the poor agricultural communities that are most vulnerable to the impacts of climate change. The project will build the capacity

of selected local communities to adapt to changes in water and land resources resulting from climate change. Part of this process will include improved capacity to conserve and manage fish stocks as an element of integrated rural livelihood development through integrated packages of small rural livelihood interventions. Complementing this capacity development process, which will apply at the national level, the project will also build capacity of selected local communities to adapt to changes in water and land resources resulting from climate change to promote sustainable agricultural development.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The objective of this project is to enhance adaptive capacity, at the national, institutional and local levels, to climate change induced changes in water resources availability for the agricultural in Cambodia. The project will assist in the development of capacity in the area of development planning and to select local adaptation options which are appropriate to address the climate change risks in the water resources sector in Cambodia.

CAPE VERDE

BUILDING ADAPTIVE CAPACITY AND RESILIENCE TO CLIMATE CHANGE IN THE WATER SECTOR

LDCF project grant: \$3,500,000

Co-financing: \$7,000,000

NAPA completion date: December, 2007

**Inclusion into LDCF Work Program:
May, 2008**

**CEO endorsement date: January, 2009
(expected)**

**Implementation start: April, 2009
(expected)**

As a small island state with limited rainfall, Cape Verde is already experiencing constraints in its access to fresh water resources. The Initial National Communication to the UNFCCC by Cape Verde (1999) identified four sectors as particularly vulnerable to climate change: water, agriculture, forestry and coastal development. The INC further identified limitation on water resources as a result of climate change as one of the main constraints to economic development in Cape Verde. Models of future climate change suggest that temperature increases of up to 4°C can be expected by 2100, and decreases in rainfall by up to 20%. In the more immediate planning horizon (next 10-20 years), climate induced changes include seasonal water shortages at an increasing number of economically important sites and year round shortages at other sites. In addition, climate variability is predicted to increase, with more storms, floods and droughts and a shorter rainy season. Clearly, climate change and variability in Cape Verde is a possible

threat to the entire development process and to all the island's communities.

Over the past two decades, the Government of Cape Verde has been relatively successful in introducing economic reforms, maintaining economic stability and generating GDP growth. The government has established poverty alleviation programmes as part of its socio-economic development strategy and progress toward achieving MDG targets has been encouraging. The problem, however, is that the gains achieved and expected are under additional threat from the impacts of climate change.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

This project addresses priorities identified in Cape Verde's NAPA and lays the foundation for a sustainable use and management of water resources under conditions of climate change. The project ensures that, in selected local municipalities, water resources continue to be sufficient under conditions of climate change, thereby providing a basic resource for livelihoods, agriculture and local industries. At the national level, the project ensures that there is capacity to provide the services, that the national water supply is in line with growing demands, and that water is not a constraint to development, tourism and poverty reduction.

Several small-scale investments is presently taking place to increase water management capacity

locally. However, these are insufficient to manage climate change associated risks. In addition, many highly vulnerable sites do not benefit from these investments. This LDCF project, therefore, builds on these existing investments to include larger or more sophisticated investments in water capture, storage and distribution. In addition, a series of investments to increase water resources availability is undertaken in highly vulnerable sites – in order to increase the resilience of local development against climate change and variability. The investments, where possible, will build upon traditional water management practices and technologies. These small-scale investments do not only demonstrate appropriate approaches, they also bring direct relief to some marginal and vulnerable communities in Cape Verde. Finally, field knowledge and expertise on how to adapt to climate change will be greatly increased through a series of demonstration and action-research projects.

At the national level the project builds the adaptive capacity of institutions and individuals involved in managing the water sector. For example, the project will assure access to improved information and improved climate change models, notably at sub-national levels. In addition, communities, municipalities and national stakeholders will gain a thorough understanding of climate change, its implications for Cape Verde, and of alternative approaches. Tools for integrating climate change and increasing climate change resilience are made available at national level and in selected municipalities. These tools address risk management, capacity to plan for climate change, and capacity to introduce alternative (i.e. climate change resilient) development

scenarios. With this capacity, stakeholders are enabled to ensure that water provides a foundation for economic development and poverty alleviation, rather than being a major constraint, as it would become in the baseline.

SYNERGIES AND COORDINATION

This project has been conceived to complement several other projects, programmes and initiatives within the water and related sectors in Cape Verde. The national investment budget includes a series of programmes and projects related to integrated water resources management, with an allocation of almost \$14 million for 2007/2008. These projects address sustainable water management, watershed management, information collection and monitoring, construction of small scale water harvesting and enhancing the management infrastructure. In addition, many international agencies are engaging in related investments, including a) an EU project supporting water distribution and sewage treatment; b) a French project supporting natural resources management and the development of tourism in rural areas; c) a Japanese project supporting the establishment of bore holes; and d) A German project supporting water supply.

Furthermore, the project is coordinated with the UNDP/GEF SPA project *“Responding to Coastline Change and Its Human Dimensions in West Africa through Integrated Coastal Area Management”*, in which Cape Verde also participates. This project, starting in 2008, aims to pave the way for adaptation measures that deal with coastal zones issues through regional collaboration.

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DJIBOUTI

REDUCING IMPACTS AND VULNERABILITY OF COASTAL PRODUCTIVE SYSTEMS

LDCF project grant: \$3,500,000

Co-financing: \$7,000,000

NAPA completion date: October, 2006

PIF approval date: August, 2008

CEO approval date: June 2009 (expected)

**Implementation start: August, 2009
(expected)**

Djibouti's location as an arid coastal state makes it highly vulnerable to climate disasters. The majority of Djiboutian population is found near the coast, and is particularly at risk from sea level rise and flash floods (as seen in 1927, 1989, 1994, and lately in 2004). The vast majority of Djibouti's rural population is highly vulnerable to climatic uncertainty, as they live in deserts or marginal infertile areas, often with highly erodible soils and limited water supply. Because Djibouti does not have permanent surface water bodies, it relies primarily on groundwater and on the seasonal flow of wadis. Climate models to the horizon of 2050 show how impacts on Djibouti's coasts, where most of its population is concentrated, are already significant, and will continue to increase with projected changes in climate. Djibouti's INC predicts a potential temperature increase of between 1.7 and 2.1 degrees Celsius, and a potential sea level increase of 8 to 39 cm. Initial studies of Djibouti's vulnerability to climate change revealed a significant impact on the fragile water balance at country level. The situation in the country will be aggravated by decreased precipitation (between 4 and 11%) as well as changes in the pattern of precipitation (geographic distribution, frequency and intensity). This combination of factors will likely lead to increased severity of dry spells as well as more intense wet extremes, accelerating erosion and floods. This will have a potentially

disastrous impact on the availability of water in the country and particularly in coastal areas. For example, groundwater recharge will decrease with a decrease in precipitation, while flash floods from wadis may occur more often due to the increase of rare but violent, precipitation events, with potential increased risks of lives lost. Sea level rise is likely to further exacerbate these impacts, particularly with respect to salt-water intrusion into the coastal aquifers which will have a detrimental impact on the already declining water quality. Combined with excessive pumping and overexploitation, sea level rise poses a severe risk to the country's urban areas. Further, fragile coastal ecosystems (coral reefs, estuaries, mangroves), that play a crucial part in the livelihood of coastal communities and act as ecological buffer zones, are already showing signs of degradation due to climate change and human pressures. Pressures on the country's remaining mangroves are expected to increase with predicted changes in the precipitation pattern, with drought and erosion leading to siltation of seasonal waterways, rapid runoff and sedimentation, resulting in a semi-permanent closing off of the mangrove.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

Because of its small size and capacity, many of the natural systems are linked and resources and technical capacity available are little. This project therefore took the approach of integrated coastal zone management and climate change. It therefore addresses several root causes for vulnerability together. The project objective is to address the impacts of climate change on coastal ecosystems and communities by implementing a set of urgent measures that will strengthen the capacity to predict future changes, while helping local populations to adapt through the adoption of more sustainable production meth-

ods, particularly in the areas of water management, agriculture, fisheries and tourism. This is achieved through a combination of three inter-related components: policy, ecosystem rehabilitation and disaster prevention and response.

The policy component of the project reinforces institutional as well as technical and technological capacity to implement integrated coastal zone management in the context of a changing climate. It includes a blend of policy initiatives to set up the enabling environment at the country level, as well as technology transfer in order to address the impacts of climate change on productive coastal systems, in particular in the water, fisheries and coastal agriculture sectors.

In the absence of this project, Djibouti would see continued planning and development of the coastal zone without due attention given to the consequences of increased vulnerability. There would be a continued lack of information and knowledge about existing resources and impacts, such as groundwater potential, soil salinity, coastal erosion and its impacts on the economy, etc.

The Ecosystem Rehabilitation component of the project addresses the increased risk of extreme climate-induced events due to environmental degradation. These include increased risks of floods, diminishing levels of seasonal rivers and aquifers, increased severity of droughts, sea level rise and its associated consequences. This component includes the implementation of physical measures to rehabilitate coastal ecosystems in order to restore their resilience to the above mentioned impacts. Alternatives for local communities are developed as a means of releasing pressure on the mangroves and on water resources. For example, the rehabilitation of mangroves yields multiple benefits: by serving as a natural barrier to seawater intrusion, the mangrove helps maintain pasture in the surrounding areas. Similarly, in conjunction with the planned development of a 150,000 urban center in Khor Angar, the project addresses issues related to the availability of freshwater for current and future communities, by promoting water extraction technologies adapted to decreased rainfall. In the absence of this project's interventions, degradation of key coastal climate buffers, such as the important mangrove systems at the two project sites will continue.

Deforestation and unsustainable exploitation of these systems will continue unabated as few alternatives exist for local populations. This will increase environmental vulnerability as well as remove an important source of livelihoods as these grounds are an important area for fishing of high value species.

The prediction and disaster prevention component of the project strengthens the country's capacity to measure and monitor the impacts of climate change, as well as the targeted communities' and the government's ability to respond to them. The ability to measure, anticipate and prevent potential disasters, including early warning systems is the primary focus of the activities implemented. It builds on an existing flood early warning system currently under development which has not factored in climate information, and also coordinates with current efforts to implement a project for the protection of the capital, Djibouti, against flooding. Without this project the country will continue to rely on ad hoc disaster relief efforts rather than preventing serious losses before they occur. Over the long-term, climate-induced risks will continue to not be factored in to the decisions being made about coastal development.

SYNERGIES AND COORDINATION

The project builds on plans and policies developed by the Government of Djibouti in relevant sectors, as well as on synergies with ongoing and planned projects. For example, the project will build on current efforts by multilateral agencies (e.g. World Bank, UNEP) to install an early warning system for wadi flooding and extends lessons learned from recently developed disaster management and response tools to the national level or in project sites, as part of the Disaster Prevention component. The project also builds on initiatives aiming to promote sustainable livelihoods and food security, such as the FAO Special Programme on Food Security, which foresees interventions to develop surface water harvesting and fisheries development. Other linkages are established with projects implemented by various partners in other regions of the country, including solar energy projects (IFAD) designed to limit fuelwood harvesting or the GEF-supported PERGSA (Conservation of the Environment of the Red Sea and Gulf of Aden) for conservation areas.

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DEMOCRATIC REPUBLIC OF THE CONGO

BUILDING THE CAPACITY OF THE AGRICULTURE SECTOR TO PLAN FOR AND RESPOND TO THE ADDITIONAL THREATS POSED BY CLIMATE CHANGE ON FOOD PRODUCTION

LDCF project grant: \$3,000,000

Co-financing: \$4,000,000

NAPA completion date: September 2006

**Inclusion into LDCF Work Program:
October 2008**

**CEO endorsement date: November 2009
(expected)**

**Implementation start: March 2010
(expected)**

Climate models predict that by 2050, the Democratic Republic of the Congo's (DRCs) average annual temperature is likely to increase by 2.5-3.7°C with seasonal droughts occurring more frequently and lasting longer. It is also anticipated that annual rainfall will increase in the "Cuvette" region (Province of Equateur), while appreciable decreases will occur in the rest of the country and extreme climate events will increase in intensity and frequency. Decreased rainfall will be felt most severely in the southern part of the country, especially, in the belt of tropical climate savannahs where over 70% of the rural population lives. It is expected, e.g., that by 2020, the Katanga province is likely to experience only five months of rainy season compared to seven months today. Farmers in such regions do not have access to varieties of agricultural seeds that are adequately adapted to these climate disturbances.

The current changes affecting the seasonal cycles and climate parameters directly threaten the pro-

duction of basic food staples for rural communities and by extension, have implications for food security for the entire Congolese population. In effect, agriculture in the Congo—the foundation for 90% of the country's population—continues to be exclusively pluvial or itinerant. As rainfall changes, particularly through shortened rainy seasons, or as the average soil temperature increases, harvests are threatened and populations rendered vulnerable, both in cities and the countryside. The consequences of climatic changes and variability, through yield changes, have already been felt in all of the agro-ecological zones of the DRC. For example, the farming season at the end of the 2005–2006 rainy season saw many farmers from the city of Moanda, in the Bas Congo province, harvesting barely a basket of maize for the equivalent of 15 kg of old seeds, as rainfall became rarer in the region.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

Considering the above impacts on the Congolese agricultural a number of urgent adaptive measures to secure food crop production have been identified. On the one hand, the project implements interventions at the national and sub-national level in terms of improved meteorological monitoring and forecasting. On the other hand, pilot interventions are implemented at the local level (farmers, communities and agricultural extension services) so as to ensure improved reactivity and resilience to climate change induced

pressures in the entire sector, and to facilitate learning, which can later be upscaled to the national level.

At the national and sub-national level the project responds to current capacity gaps in the management of climate change risks in the agricultural sector. These include, among others, insufficient and dilapidated equipment for agro-meteorological stations, ageing and insufficiently trained staff to carry out agro-meteorological measurements, and outdated methodologies for archiving and safeguarding observation data. This in turn implies that farmers are confronted with outdated guidance on appropriate dates for sowing various crops. The project, therefore, supports capacity building for farmers and meteorological services at the national, regional and local level, with a view to establishing updated vulnerability/risk and impacts maps, seasonal forecasting and agro-meteorological bulletins for agricultural services. An agro-hydro-meteorological assistance system is being set up particularly to enable development of dynamic agricultural calendars and calendars to project dates marking the beginning and end of the rainy season. This is further accompanied by a measure to strengthen capacities among agricultural actors to enable them to design and implement strategies that respond to climate risks, both at the sector level and the level of farms and parcels. To this end, synergies between research institutes, meteorological and agricultural services is being promoted, and the implementation of a national monitoring system for yields and an early warning mechanism for food shortages is being established. Finally, improved knowledge and

forecasting of climate changes in progress allows for development of technological packets adapted to new meteorological risks, which is being made available to farmers and technical services in the Ministry accompanied by a suitable training program.

At the local level, the project implements pilot adaptation measures in four vulnerable regions (Bas Congo, Equateur, Kasai Oriental, and Katanga). This includes improving the resilience of food production systems by introducing proven adaptation measures, and, where and when agriculture is heavily threatened by emerging climate change hazards, livelihood diversification options. Direct agricultural adaptation measures to be implemented includes: a) Diffusion of climate-tolerant varieties of maize, cassava and rice; b) Selected farming techniques and "climate resilient" soil, water and crop management techniques; and c) Updating of crop calendars and technological packets available to farmers for better coping with climate variability.

SYNERGIES AND COORDINATION

In the agricultural and livestock sector, the government has implemented, with support from various donors, the following programs and projects, with which this project is coordinated to maximize project impacts: a) The Multi-sectoral Rehabilitation and Reconstruction Program (PMURR) with the World Bank; b) The Project to Support the Rehabilitation of the Agricultural Sector (PARSAR) with the African Development Bank; c) The Lake Tanganyika Integrated Rural Development Program (PRODAP).

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ERITREA

INTEGRATING CLIMATE CHANGE RISKS INTO COMMUNITY BASED LIVESTOCK MANAGEMENT IN THE NORTHWESTERN LOWLANDS

LDCF project grant: \$3,000,000

Co-financing: \$3,400,000

NAPA completion date: May 2007

**Inclusion into LDCF Work Program:
September, 2007**

**CEO endorsement date: April 2009
(expected)**

**Implementation start: June 2009
(expected)**

Eritrea's livestock production system and related livelihood opportunities of pastoralists are highly vulnerable to long-term climate change, including variability. Climate models suggest that Eritrea will likely experience rising temperatures and decreasing rainfall over the coming decades. Resultant impacts will include decreasing and more variable run-off, increased occurrence of dry spells and multi-year droughts, and will be felt heavily in the pastoral sector through diminishing soil moisture and decreases in rangeland productivity. The productive and reproductive efficiencies of the pastoral system have been declining progressively over the past decades due to a number of baseline issues, but these pressures are now compounded by the impacts of climate change. With crop cultivation and animal husbandry accounting for 60 percent of rural incomes, while in specific regions such as the lowlands incomes from livestock become even more important, anticipated climate change will have serious repercussions on rural poverty and well-being.

Over the years, pastoralists have evolved a production system that adapts to the fluctuations in feed and water supply availability. The major river basins

and the areas with relatively higher rainfall and soil fertility of the rangelands serve as the dry season camp, while the open grazing land of the drier areas form the wet season camp. The routes that pastoralists, including their livestock, use to travel between seasons are well defined and based on known water points, feed and tree shade. The movement involves mainly the larger animal species, but in areas where heat stress is acute all livestock species are forced to move seasonally.

Northwestern rangelands (wet season camp) are especially sensitive to the impacts of drought. Recurrent droughts and high temporal and spatial variability of rainfall produces negative impacts on the water resources availability by depleting underground water through evaporation. Inadequate recharge of underground aquifers of rangelands results in lower drinking water availability for livestock and reduces livestock productivity as a result of lower biomass productivity. In effect, the rangelands are already under severe pressure from drought. Recent records showed that frequent droughts and inter-annual precipitation variability between 1992 and 2004 have contributed towards the annual deaths of thousands of livestock species such as cattle and camels.

Thermal stress is increasingly exceeding thresholds that animals can tolerate, leading to shortening of grazing hours that most of grazing takes place during night time or early morning, decreased feed intake and interference with animal productive and reproductive functions. Without adaptation interventions, the linkage between pastoralists and land will be adversely affected and lead to adverse economic impacts, changes in social structure, cultural identity, and even political instability.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

As with any multi-faceted problem, reducing the vulnerability of the livestock sector to climate change, including variability, necessarily involves also addressing the linkages between agriculture and water resources as well as barriers to livestock management in Eritrea which have little to do with climate change. Traditional coping practices have been affected by land and ground water use change, desertification, poverty, and border conflicts. Land and ground water use change is occurring in most of the rangelands and in particular in those areas with higher rainfall (such as the southwestern lowland and the riverine areas).

The conversion of some rangelands into rain-fed cropping (even in areas with too low rainfall to grow crops) while others are converted into irrigation is placing pressure on livestock as grazing regions are increasingly confined to marginal areas. The movement of livestock is increasingly restricted due to land fragmentation. In the more arid rangelands, the process of desertification is also increasing pressure on rangelands. Desertification has caused conversion of perennial grasslands to savanna dominated by annual grasses.

The above issues are being tackled to varying degrees of success through government and donor projects and programmes and this project is, therefore, being linked directly to these ongoing efforts, aiming to address the additional threats posed by climate change. This is done through: a) various pilot activities in 3 specific communities in the particularly vulnerable arid north-western lowlands, and b) broader based technical capacity building for communities and relevant institutions.

For the first part, this project tests options for more climate resilient livestock management systems at the local level. This includes the following activities: a) Implementation of demonstration activities that integrate climate risks into water (including irrigation) and livestock management in pilot areas implemented; b) Training of communities and relevant stakeholders on how to identify and support the implementation of climate resilient rangeland management priority practices; c) Creating strengthened

linkages between short- to medium-term climate forecast centers and pastoral communities to promote timely management decisions d) Implementing measures that will facilitate the pursuit of alternative livelihood options.

For the second part, the focus is on targeted capacity building initiatives that develops the skills of key stakeholders to systematically integrate climate change risks into pastoral land and water management in the context of agricultural and food security-related strategies, policies, measures (both at the national/sub-national level and the community level). Specific outputs includes: a) personnel trained in forage conservation techniques and in managing and distributing water based on available climate information; b) improved knowledge on reseeding of the rangeland with climate resilient varieties; c) extension support staff and other relevant stakeholders trained in climate change risk management; d) awareness of climate change risks and needs pertaining to livestock and water management in rangelands improved for policy makers; and e) development of a rangeland management plan incorporating climate change risks over the next 30 years.

SYNERGIES AND COORDINATION

The project will be fully linked to existing baseline projects and programmes sponsored by the government and international donors, including. These includes, among others, The *Integrated Rural Development Project (IRDP)*, *Lutheran World Federation Nutrition Project* and *Gash Barka Livestock and Agriculture Development Project*. All are community development initiatives that cover the northwestern lowland, aiming to contribute to the livelihood of the populations engaged in traditional livestock production and increase the contribution of the agricultural sector to the national economy by improving productivity of crop, livestock and community. Furthermore, the project draws on technical assistance from the Drylands Development Centre, which specializes in assisting countries in development projects in the drier parts of the world, as well as the Water Governance Facility (a joint UNDP-SIDA initiative which seeks to advance socially equitable, environmentally sustainable and economically efficient management of water resources).

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GAMBIA

STRENGTHENING OF THE GAMBIA'S CLIMATE CHANGE EARLY WARNING SYSTEMS

LDCF project grant: \$930,000

Co-financing: \$1,085,000

NAPA completion date: January, 2008

PIF approval date: August, 2008

**CEO approval date: January 2009
(expected)**

**Implementation start: February, 2009
(expected)**

The Gambia has, since the late 1960s, and persisting into the present, experienced the impacts of climate change as a negative trend in rainfall, which has placed tremendous pressure on natural resources and ecosystems. Observations have also shown changes to spatial patterns and temporal changes in rainfall in the last sixty years, including increased frequency of heavy rainfall above 50 mm/day, and a record number of lowest and highest rainfall years. Most of The current trends in rainfall are expected to continue for the coming decades making the Gambia highly vulnerable to flooding and drought disasters.

In the Gambia, in addition to early warning for extreme events the need for strengthening these by integrating climate change information applications has been clearly identified. Climate information ranging from seasonal forecasts to longer term climate change projections need to be coupled with baseline social, ecological and economic information that indicate vulnerabilities in key sectors. Climate information is required for

instance to monitor and respond to climate influenced diseases and health problems, design drainage infrastructure and support land-use planning (e.g. to assist farmers to anticipate adverse climate conditions prior to the onset of planting seasons).

PROJECT ACTIVITIES AND EXPECTED IMPACTS

While the Gambia has already implemented some measures and policies for early warning and disaster prevention, these do not adequately address the consequences of climate change. Furthermore, effective people-centered and climate change adjusted early warning systems, require a) Risk Knowledge, b) Monitoring and warning services, c) Dissemination and communication d) Response capability. The Gambia's capacity gaps are apparent in each of these areas.

This project, therefore, strengthens the foundations for effectively monitoring, communicating and responding to climate related risks. This effort includes both urgent and immediate needs for addressing climate variability as well as longer-term capacities to respond to future climate changes. The project is structured around three components which address the four elements of effective people-centered early warning systems mentioned above.

Responding to the inadequacy of the existing hydrological and meteorological networks in pro-

viding sufficient high-quality data for a fully operating early warning system, the first component addresses additional capacity needs necessary to operate a national scale early warning system. This includes training of senior-level hydrological and meteorological personnel to develop the skill sets necessary for data analysis and transformation into early warning information; upgrading the capacity of hydrological and meteorological networks (e.g. new/upgraded hard- and software); maintaining archives, including quality control and digitization of historical data; obtaining systematic social and environmental data for vulnerability analysis; and securing institutional mandates for collection and analysis of vulnerability data.

The second component addresses the fact that people often fail to heed warnings from early warning systems since the warnings do not address their values, interests and needs. Messages are often not sufficiently targeted to the users and do not reflect an understanding of the decisions stakeholders need to make to respond to the warning. Individuals may perceive the warning as irrelevant or find it impossible to heed, for example because they are reluctant to abandon the assets upon which livelihoods depend, such as livestock, or that have personal importance, such as belongings. Furthermore, most warnings are delivered to the whole population through the media and are not tailored to the needs of individual groups. Through project funding, professionals in weather, climate and hydrology are trained to produce information products to meet the planning and operational needs of the various user groups in the country

thereby ensuring that urgent warning information goes the “last-mile” to reach all vulnerable populations in a timely manner. Also, capacity building sessions on the production and interpretation of weather, climate and hydrological information are held with the various user-groups (sector of activity) in order to ensure understanding and use of the information. Appropriate and effective means of disseminating the various information products to the various user-groups are also developed and implemented through a number of concrete demonstration activities.

The third component reinforces existing regulations and laws, and builds institutional capacity to manage climate risks and factor these in to planning and zoning decisions. This is achieved by systematically reviewing relevant policies for climate sensitivity and subsequently revising them to factor in climate change adaptation needs.

SYNERGIES AND COORDINATION

The project draws on lessons, tools, and climate predictions from a number of regional assessments recently completed including: a) *Development of Regional Climate Change Scenarios for Sub-Saharan Africa*, b) *Assessing Global and Regional Climate Change Scenarios for West Africa*, and c) *Capacity Building in Analytical Tools for Estimating and Comparing Costs and Benefits of Adaptation Projects in Africa*. Furthermore, the project is coordinating its activities with work done under the UN Inter-Agency working group for disaster reduction established in 2005.

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HAITI

STRENGTHENING ADAPTIVE CAPACITIES TO ADDRESS CLIMATE CHANGE THREATS ON SUSTAINABLE DEVELOPMENT STRATEGIES FOR COASTAL COMMUNITIES

LDCF project grant: \$3,500,000

Co-financing: \$7,000,000

NAPA completion date: December 2006

**Inclusion into LDCF Work Program:
September, 2008**

**CEO endorsement date: March 2010
(expected)**

**Implementation start: June 2010
(expected)**

Ranking 155th in the HDR list, Haiti belongs to the poorest LDCs group and has long been vulnerable to climate related disasters. Growing scientific evidence shows that new climate trends and new climate risks patterns are now emerging in Haiti as a result of global warming. The INC and NAPA established that the annual average temperature across the country is expected to rise in the range of 0.8°C to 1°C by 2030 and in the range of 1.5°C to 1.7°C by 2060. These changes are predicted to be accompanied by increasing rainfall variability, decrease in precipitation in the range of -5.9% to -20% by 2030, and increased frequency and intensity of extreme floods and droughts events. Haitian observations tend to confirm these scientific findings: people report dry seasons that last longer, while rainy seasons are shorter but more intense. Anticipated increases in sea levels and sea surface temperatures are also likely to be primary causes for increased beach erosion, salinization of fresh water aquifers and estuaries, coastal erosion and increased coral reef bleaching throughout the island. There is also a trend that suggests increased frequencies of hurricanes. Recent research revealed that Haiti's southern peninsula presents a heightened vulnerability to hurricanes compared to the rest of the country. These climatic changes and their associated impacts pose a direct threat to the island's coastal settlements and economies. Indeed, the population is primarily concentrated in low-

elevation coastal lands which prove to be highly prone to hurricanes, storm surges, flooding, erosion and salinization. The densely populated slum districts of Haiti's coastal cities are located to a large degree in flood plains which render the poorest even more vulnerable to catastrophic hydrometeorological events.

While current climate change exerts indisputable pressures on Haiti's coastal areas, a number of non-climate driven problems seriously increase the vulnerability of Low Elevation Coastal Zones (LEZs) to climate hazards and limit their capacity to adapt. The main immediate threats on Haiti's coastal systems include a) uncontrolled and unplanned urbanization along the coast boosted by rapid population growth and booming rural migration, b) unsustainable farming practices, such as overgrazing, overpumping of coastal aquifers, or clearing of mangroves for agriculture and charcoal production, and c) pollution of coastal water bodies and ecosystems due to sub-optimal or inexistent urban waste and wastewater treatment systems. The effect of these pressures leads to loss of natural coastal buffer zones and exacerbates exposure to climate change and sea-level rise impacts. Combined with current baseline stressors on LEZs, climate change effects are likely to hamper attainment of MDGs and national development objectives in Haiti if no risks reduction responses are put into motion.

To address these challenge, the sustainable solution for Haiti is to establish a national system that can support the process of adaptation of the coastal development sector in a continuous and sustainable way, and that can address both climate driven and baseline problems in an integrated manner. However, several barriers exist today that hamper Haiti from achieving the above solution, including: a) inadequate planning and technical environments which impede promotion of climate risks management in the coastal development sector, b) insufficient institutional capacities and donor coordination that limit opportunities to identify and channel adaptation resources in relation to needs, and, c) inappropriate

coastal development practices that do not account for climate change and have the potential to increase coastal areas' vulnerability to emerging climate risks and disasters.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The LDCF project aims to overcome these barriers and to strengthen adaptive capacity of populations and productive sectors in coastal areas to address increasing climate change risks. This includes 3 basic project activities: a) improving institutional capacity to plan for and respond to increasing coastal hazards, b) mainstreaming climate risks into existing humanitarian and development investment frameworks, and c) local pilot activities to demonstrate how to enhance climate change resilience in the LECZs.

Firstly, the project fosters a policy shift from reactive crisis management to proactive risk management. LDCF funding is used to train policy-makers and key technical staff, and help them incorporate climate hazards into coastal zone planning. Furthermore, the project informs climate change-considerate legislation for the management of coastal areas and facilitates alignment of existing coastal management programmes with a view of stronger integration and climate resilience.

Construction and development standards are also reviewed and upgraded so that key features of climate impacts in Haiti are incorporated in the design of coastal infrastructure and equipment, and adaptation requirements for the LECZ are properly incorporated in the design of the new Environmental Information System for Haiti. Furthermore, it will strengthen institutional set-ups and mechanisms to adapt to anticipated climate change impacts, and ensure that information flows are improved between climate monitoring, forecasting and early warning services to municipalities and communities in high-risk coastal areas. Disasters prevention, rescue and early recovery measures and plans will also be upgraded to take into account the additional risks induced by climate change.

Secondly, the project helps make the costs of climate change on human development in LECZ more explicit in order to mobilize the donor community and stimulate the creation of a National Adaptation Coalition. More specifically, a Multi-donor Programmatic Partnership for CRM is put in place, including a package of interventions to address climate change risks æ policy, regulatory and institutional reforms, capacity building, and investments æ to be executed and funded in a coordinated way, from a variety of sources, including national budgets, bilateral development cooperation agreements,

country assistance programs of multilateral agencies, and private foundations.

Finally, the project will implement a suite of specific community-based adaptation measures to demonstrate how to withstand the impacts of extreme weather events (hurricanes and floods) and sea level rise (increased erosion, submersion and salinization). New risks assessment procedures and zoning regulations is tested in order to align municipal planning processes with emerging coastal hazards and shoreline changes. The project also produces and implements shoreline management plans in selected high-risk areas so as to ensure climate resilience of current coastal development processes and provide a cohesive framework for carrying out coastal adaptation activities at the field level. Specific attention is paid towards the maintenance of "buffer zones" in the LECZ, through the protection and restoration of natural coastal defenses, such as mangroves and sand beaches systems, by using environmentally-friendly technologies and sustainable land management methods. Additionally, the project pays particular attention to the development of suitable systems to secure sources of potable water for coastal communities prone to saline intrusion resulting from accelerated SLR and more frequent flooding. Innovative coping mechanisms such as rainwater harvesting, micro surface and ground water recharge and treatment facilities is piloted and demonstrated for up-scaling over time and in future projects. It is expected that the results achieved through the pilot activities will feed into the process of institutional strengthening of key central agencies by providing concrete examples and field guidelines for the development of climate proofed investment plans and long-term development policies.

SYNERGIES AND COORDINATION

This project concept has been discussed with different actors in the Government of Haiti such as the Ministries of Environment, of Interior, and of Planning and External Cooperation. The project closely interacts with the following programmes currently under implementation in Haiti: "Emergency Recovery and Disaster Management Project" (WB), "Local capacity building for better risks management" (EU), "National Programme for Early Flood Warning" (IDB), "Strengthening of the National Disasters Risks Management System" (UNDP), "Environmental Management Support Programme" (UNDP), "Flood Management Programme in Jacmel's Municipality" (AFD), "Integrated Watershed Management in the South-East Provinces" (AECI), "Enhancing Environmental Management Capacities in National Institutions" (MoE/IDB).

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MALAWI

CLIMATE ADAPTATION FOR RURAL LIVELIHOODS AND AGRICULTURE (CARLA)

LDCF project grant: \$3,000,000

Co-financing: \$24,305,000

NAPA completion date: March 2006

Inclusion into LDCF Work Program: June 2008

**CEO endorsement date: December 2008
(expected)**

**Implementation start: March 2009
(expected)**

Malawi is a country heavily dependent upon rain-fed subsistence agriculture, with more than 80% of the population generating their daily livelihoods from small-scale agriculture, and currently around 60% having insecure access to food on a year-round basis. While the newest climate models for Malawi show no conclusive trend in average rainfall, they do indicate a later onset of the rainy season.

This results in shorter rainy seasons with higher average precipitation intensities, which, coupled with rising temperatures, leads to longer dry seasons and more frequent and severe droughts. Faced with increasing rates of climate change induced extreme weather events such as recurrent floods and droughts, the current baseline initiatives aimed at fostering sustainable economic growth and improved rural livelihoods in Malawi has been put at a high risk of failing. This in turn could lead to deteriorating food security and failing livelihoods among the large group of already

vulnerable people of rural Malawi, as well as to the economy of Malawi as a whole. Malawi has large natural resources, in particular fresh water, which could be utilized to cushion the effects of Climate Change, but these are vastly undeveloped at present.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The project builds directly on baseline activities supported by the African Development Bank's *Smallholder Crop Production and Marketing Project (SCPMP)*, which supports irrigation development (including development of small scale irrigation schemes, development of land for crop production, and improvement of cropping intensity and productivity), and a farmer support programme (including support for water users associations, training in water management, crop production and pest control technologies, etc.)

The project adds a climate change adaptation perspective to the baseline investments through two key components: a) Investments aimed to improve agricultural practices, land management and natural systems as well as rural livelihoods through targeted adaptation interventions b) The creation of an enabling environment for climate risk management.

Specifically, the first part includes activities to enhance water distribution, promote better irrigation efficiency, change irrigation schedules,

water recycling, groundwater capture, and system rehabilitation. As a result of climate change risks, attention is also given to water harvesting including the construction of small dams, and management of catchments of dams and rivers providing irrigation water, reducing siltation of dams/rivers for irrigation.

The second part creates an enabling environment for climate risk management to maximize positive impacts of the abovementioned investments, sustain their impacts in the long term, and lay the foundation for replication of best practices beyond the direct project activities. Activities will

address: a) plans, policies, legislation/regulations, and resource allocation; b) institutional coordination; c) generation and tailoring of knowledge on climate risk management for specific user groups (particularly in the context of the investment component); and d) awareness raising.

SYNERGIES AND COORDINATION

The project will be integrated into the ongoing investments by the AfDB's 'Smallholder Crop Production and Marketing Project (SCPMP)', which assures maximum synergy with efforts to improve food security at the national level.

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MAURITANIA

REDUCING VULNERABILITY OF ARID OASIAN ZONES TO CLIMATE CHANGE AND VARIABILITY THROUGH IMPROVED WATERSHED MANAGEMENT

LDCF project grant: \$1,630,000

Co-financing: \$1,400,000

NAPA completion date: November 2004

**Inclusion into LDCF Work Program:
May 2007**

CEO endorsement date: January 2009

Implementation start: March 2009

PROJECT ACTIVITIES AND EXPECTED IMPACTS

This project proposes to create catchment devices and to promote the infiltration of runoff to replenish groundwater in the oasian zones to conserve water supply and, at the same time, improved management of the water demands based on improved hydro-climatic information is needed to ensure sustainable use of a diminishing resource.

The West African climate, particularly in the Sahel, including Mauritania, has been undergoing recurrent variations of significant magnitude since the early 1970's. The whole region has experienced a marked decline in rainfall since around 1968-1972. Mauritania has experienced chronic drought over the course of the last thirty years which has had negative impacts on the rural communities who have been subject to increased water stress. The response has been to further exploit both surface and groundwater resources with little planning. A major environmental vulnerability related to climate change which is resulting from current practice is a drop in the water tables, which has not ceased to decrease during subsequent years of precipitation deficits. The supply of water to cities and large towns in Mauritania is drawn from groundwater from the nearby oasian zones. Current practice is resulting in frequent deficits for human consumption and agriculture needs in these oasian zones

The long-term goal of the project is to improve water management in light of climate change impacts in order to improve ecological functioning and human well being. The project will address urgent issues through improved environmental management and, show how climate change information and improved data on water can be used to enhance resource management and decision making at several levels, including technical, policy, and community level demand side management.

The project will enhance the capacity of population for improved local water management is increased through improved awareness and implementation of water management strategies and techniques which are appropriate to a changing climate. The project will also ensure that the correct information and policy management systems are put in place to ensure improved medium and long term planning to sustain water resources in an increasingly arid climate.

NIGER

IMPLEMENTING NAPA PRIORITY INTERVENTIONS TO BUILD RESILIENCE AND ADAPTIVE CAPACITY OF THE AGRICULTURE SECTOR TO CLIMATE CHANGE

LDCF project grant: \$1,900,000

Co-financing: \$4,050,000

NAPA completion date: July, 2006

PIF approval date: May 2007

**CEO approval date: January 2009
(expected)**

**Implementation start: March 2009
(expected)**

The Sahelian eco- and agricultural systems are very sensitive to even small changes in climate and climate variability. Rainfall patterns are extremely erratic, and can cause floods one year and drought the next. The projected increase in temperature (leading to increased evapotranspiration) and decrease in rainfall will thus further increase climate vulnerability in a society which is already heavily dependent on rainfed agriculture and pastoralism for survival. The adaptive capacity of the Nigerian farmers and pastoralists to deal with such challenges is at best marginal, and non-climate driven problems such as maladaptive farming practices (e.g. overstocking with livestock and ploughing of erodible soils), low market access due to poor or non-existent roads, and rapidly increasing rural populations leading to expansion of agriculture into previously marginal areas, further exacerbates the situation. Existing problems such as periodic food shortages, unsuitable agricultural practices and recurrent water shortages will undoubtedly only increase unless climate resilience strategies are integrated into development efforts in Niger.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The project contributes to the building of adaptive capacity to climate change in the agricultural sector of Niger. First of all the project focuses on increasing the resilience of food production systems and food insecure communities faced with the impacts of climate change. This includes a wide spectrum of new adaptation initiatives implemented in a selection of pilot communities. Innovative water harvesting measures is being tested for increasing crop productivity and thereby increase resilience to climate change, e.g. the "Zai" methodology, which entails digging holes (0.5 m diameter) at intervals of 1-2 m, and filling these holes with a mixture of compost, manure and topsoil. Rainwater runs off the bare soil surface between the holes and ultimately drains into them. In this way, each "Zai" hole becomes a biological hotspot, with greater soil-water and nutrient content than the surrounding soil. Crops (e.g. millet, sorghum and maize) are sown in the "Zai" holes and their productivity is greatly increased relative to plants sown outside of these holes. Another initiative to be implemented is the dissemination and testing of more drought resilient varieties of traditional crops such as millet, sorghum and maize.

The barriers to widespread use of such crop varieties include technical capacity and financial constraints. Seeds need to be bought, and the rural poor farmers cannot afford this cost. The proposed project can therefore be instrumental

in establishing mechanisms for the sustainable diffusion of drought-adapted crop varieties to vulnerable communities. The facilitation of food banks is another activity implemented to increase the climate change resilience of local food security. Food shortages often occur for a brief period at the end of the dry season in rural communities, a phenomenon that is likely to increase with climate change. Food banks are one method of supplying food during critical periods. This activity is sustainable, because once the food bank is established, a self-sustaining business is generated, whereby food is bought at a discounted rate from the government, stored in the bank and then sold to the rural communities. A final measure implemented to counter the threat of climate change induced impacts on crop productivity is to improve water management practices.

The Niger River is currently underutilised as a source of irrigation water for several reasons. One is that rainfall patterns have been predictable and therefore reliance on more expensive alternative sources of water has not been a priority. Secondly, under utilization of surface water resources through irrigation has been constrained due to a shortage of funds. At present only 10% of the 270,000 ha of land suitable for irrigation has been developed in Niger.

A second leg of the project focuses on increasing the institutional capacity of the agricultural sector, especially in regards to information and extension services to farmers. This includes, among other things, distributing seasonal weather forecasts and providing local advice to the design of water and crop management strategies. The project also supports the incorporation of adaptation to climate change issues into provincial and local development and risk management plans.

SYNERGIES AND COORDINATION

Niger is also one of the project countries of the UNDP-GEF/SGP Community Based Adaptation Programme. It is likely that many of the community based interventions that are likely to emerge for funding through the CBA mechanism will also focus on agriculture related activities. The CBA initiative will therefore be a timely complement to this LDCF project and exchanges have already commenced between GEF/SGP and coordinators of the LDCF project. Coordination and synergies is also being secured with other related projects being funded through government and bilateral sources, e.g.: the Niger government's "Special Programme of the President", the Canadian government's "Fight Against Poverty Fund"; and GTZ's "LUCOP (Fight Against Poverty project)".

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SAMOA

INTEGRATING CLIMATE CHANGE RISKS INTO THE AGRICULTURE AND HEALTH SECTORS

LDCF project grant: \$2,000,000

Co-financing: \$2,000,000

NAPA completion date: December 2005

**Inclusion into LDCF Work Program:
May 2007**

CEO endorsement date: November 2008

Implementation start: January 2009

As a Least Developed Country, and a small island developing state, Samoa is particularly vulnerable to the adverse effects of climate change. A recent climate risk profile for Samoa identified the following possible impacts a changing climate could have in Samoa:

- Flooding resulting in large bodies of stagnant water, leading to increases in mosquito populations that transmit diseases including filariasis, dengue fever, typhoid, diarrhea as well as number of gastrointestinal infections;
- Extreme rainfall events in Samoa resulting in overflow of sewerage systems and the spread of pathogens;
- Flash flooding, associated with extreme rainfall events resulting in serious injuries and loss of life;
- Coastal and surface flooding causing widespread damage to infrastructure such as buildings, roads and utilities and inundation of coastal areas;
- Heavy rainfall causing major damage to crops in Samoa. Heavy rains in February 2005 reduced the supply of fresh food products, contributing to higher market prices. Certain crops (e.g. pawpaw) were almost completely wiped out;
- Heavy rainfall causing serious erosion in certain parts of the country. This loss of soil undermines the viability of plantations and other forms of subsistence agriculture, sedimentation in coastal waters threatening fish stocks;
- Drought affecting access to safe drinking water, dehydration, respiratory problems from increased levels of particulate in the air;
- Loss of agricultural and livestock productivity compounded by the fact that Samoa does not have extensive irrigation networks or water storage facilities to buffer the effects of drought;
- Loss of food security and incentive for farmers to continue working their land, which has the potential to undermine food security in Samoa. In marine ecosystems studies have shown that is a correlation between increased sea surface temperatures and incidents of fish poisoning. With reef fish a major part of the Samoan diet, there is a very real threat of more cases of fish poisoning. Damaged marine ecosystems (e.g. coral bleaching) add pressure to the already depleted fish stocks. This will lower the

availability of fish for consumption. This will cause dietary problems for those who depend on reef fish for nutrients. Offshore fish catch is also highly dependent on sea surface temperatures

- Increased incidence of agricultural pests and diseases as a result of drought causing stress in crops and livestock, lowering their resilience to disease and pests;
- Strong winds associated with cyclones resulting in widespread damage to crops, ruining household plantations and increasing market prices and dependence on imports;
- Heat stress associated with the rise in average daily temperatures; and
- Loss of land due to sea level rise reducing further farming land in the coastal zone;

The Government of Samoa, has thus recognized given the potential impacts the need to incorporate climate risks and adaptation into the agricultural and health sectors

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The objective of the project is to increase the resilience and adaptive capacity of coastal communities in Samoa to the adverse impacts of on agricultural production and public health

In order to achieve adaptation benefits the project will:

- a) Introduce a systematic process of capturing, analyzing, processing and disseminating climate risk information for vulnerable sectors (demonstrated in the priority development segments of food production and public health);

- b) Inform sectoral policy processes and investment decisions through tangible climate risk data, provided in an accessible way and backed up by a strong underlying climate data information system;
- c) Introduce targeted education/health promotion activities for public service providers and sectoral planners about climate change projections, their impact on human health and livelihood security, and available short-term risk reduction as well as long-term climate change adaptation options;
- d) Demonstrate and analyze the benefits of crop diversification and drought- and saline-resilient crops at the community farming level, strengthening the options available to local farmers to deal with climatic uncertainties and unpredictable dynamics in local food markets;
- e) Analyze the relationship between climate trends and vector-borne, water-borne, food-borne and heat related illnesses and thus provide a critical mass of data and knowledge for the design of more effective disease prevention programmes;and
- f) Enable exchange of experiences between Pacific SIDS on matters of climate change monitoring and agriculture/health sector adaptation

The project will also enhance the technical and organizational capabilities of the Samoa Meteorological Division (MD) to monitor climate trends and provide climate risk and early warning communications to the agricultural and health sectors to help augment existing Disaster Risk Management processes. It will also improve the capacity of, Samoa's public health planners and public health workers strengthened to reduce the impact of climate change on public health

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SIERRA LEONE

INTEGRATING ADAPTATION TO CLIMATE CHANGE INTO AGRICULTURAL PRODUCTION AND FOOD SECURITY

LDCF project grant: \$2,644,800

Co-financing: \$2,775,000

NAPA completion date: June, 2008

**Inclusion into LDCF Work Program:
September, 2008**

**CEO endorsement date: October 2009
(expected)**

**Implementation start: May, 2011
(expected)**

Sierra Leone's economy depends heavily on its natural resources. Agriculture is the largest economic sector in Sierra Leone, contributing (in 2006) to approximately 46% of GDP and employing over 65% of the labor force. Rice is the main agricultural production and it is mainly cultivated for subsistence purposes.

The impacts of climate change are already tangible in the country. Indeed, Sierra Leone is experiencing climatic hazards such as seasonal drought, strong winds, thunderstorms, landslides, heat waves, floods and changed rainfall patterns. As reported in the Sierra Leone's National Adaptation Programme of Actions (NAPA), poor communities have suffered the most from climate change impact, as floods destroyed their crops and increased droughts caused water shortages in some areas of the country. In particular crop production, being highly vulnerable to climatic change, has been affected by prolonged period of dry days even during the rainy season

(July/September) and heavy rains in March that prevented farmers to burn their fields resulting in weeds expansion. As an example of predicted climate change impact on crop production, for temperatures above 25°C, rice production is expected to retard and yields to decrease. Other production such as maize, millet and cocoa are projected to be negatively affected by climate change. Considering that food production depends entirely on subsistence farming, a decline in agricultural productivity – coupled with the increasing trend of food prices - is expected to ultimately worsen current food security problems.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The objective of this LDCF project is, therefore, to lessen the impact of climate change on vulnerable rural groups, as well as on natural resources critical for sustaining agricultural production and increasing food security. The project consists of three main components focused on both implementation of concrete adaptation measures to reduce the vulnerability of the country's food production, and broader based capacity building measures at the national and local levels.

The first component aims at improving the resilience of rice farming to climate variability, in order to ensure food security on the long term. This objective is achieved through various concrete activities, including: a) mapping and characterization of vulnerability of inland swamp rice

production; b) establishment of 100 ha of climate proofed inland rice fields in inland valley; c) making rice production/yields more resilient to climate change through the adoption of climate resilient rice varieties and more efficient soil and water management practices.

The second component aims to promote integrated Natural Resource Management (NRM) and climate resilient irrigation practices. The NAPA of Sierra Leone emphasizes that food security problems, exacerbated by climate change, can be minimized if adequate irrigation systems are installed in the uplands and viable drainage and water control systems are implemented in the lowlands. More concretely this includes the following activities: a) increasing water efficiency for irrigation in the uplands; b) promoting small scale irrigation schemes; c) improving drainage system and water control measures in lowland sites; and d) training of farmer based organizations (FBOs) on sustainable water management. In view of the likely increase in agricultural demand for irrigation water, optimization of agricultural irrigation is fundamental. Improved and more efficient irrigation schemes not only helps rural farmers sustain production in periods of low rainfall, but also contributes to suppressing weed growth in rice fields. With regard to the drainage systems, it is important to address the possible impact of climate change on their capacity and resilience.

The final component focuses on capacity building and targets two different audiences: a) national professionals mainly at the meteorological department with the involvement of other key stakeholders at the national level (i.e. policy makers); and b) general public, the latter with particular attention to women and children. Concerning the capacity of national government professionals,

training is provided to different categories of personnel (forecasters, observers, instrument technicians, etc) in the meteorological department. Also, recognizing that weather and climate information is critical for agriculture, sixteen weather stations are being improved/established to improve functionality of the monitoring system.

SYNERGIES AND COORDINATION

This intervention is closely linked to the Rural and Agricultural Development Project (RADEP) that IFAD is currently implementing. The RADEP global objective is to overcome rural poverty in the project area by: a) increasing the income of the target groups; b) improving rural household livelihoods; c) strengthening the capacities of local institutions. Through this bundling with the RADEP, coordination with relevant activities of projects that are complementary to the latter will be ensured. In particular, links are being established with: a) the FAO/Government of Italy-supported *Food Security through Commercialization of Agriculture (FSCA) Project*, which will support the establishment and strengthening of sustainable FBOs and from which both the RADEP and the IFAD/LDCF project could benefit in the area of capacity building of farmer-based organizations; b) the second phase of the FAO/Government of Germany-assisted project *Development of a Sustainable Seed Programme in Sierra Leone*, which coordinates efforts to increase capacity for seed production and processing and widespread dissemination; c) the JICA-funded *Agricultural Development Project in Kambia*, which develops technical packages for rice and vegetable production; and d) the programme *“Enhancing smallholder access to NERICA seed for alleviating rural poverty in Western and Central Africa”*, implemented by the Africa Rice Centre (WARDA) with a grant from IFAD.

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SUDAN

IMPLEMENTING NAPA PRIORITY INTERVENTIONS TO BUILD RESILIENCE IN THE AGRICULTURE AND WATER SECTORS TO THE ADVERSE IMPACTS OF CLIMATE CHANGE

LDCF project grant: \$3,000,000

Co-financing: \$3,000,000

NAPA completion date: July, 2007

**Inclusion into LDCF Work Program:
January 2008**

**CEO endorsement date: January 2009
(expected)**

**Implementation start: March 2009
(expected)**

Sudan's INC process established that average annual temperature will increase between 0.8-1.7 degrees Celsius by 2030 and be accompanied by increasing rainfall variability, particularly during the rainy season. Agro-climatic zones will shift southward, rendering small-scale farmers and pastoralists living in many parts of the country increasingly unable to sustain current production levels of sorghum, millet, and fodder for livestock. The potential impact of these changes on national food security could be severe, especially for rural livelihoods of small-scale farmers and pastoralists.

These changes in temperature and rainfall patterns represent a priority threat to food security in Sudan's agriculture-based economy. Agriculture including livestock provides the primary means of livelihood for more than 80% of the population, accounts for almost all of domestic supply of staple food (sorghum, millet and animal production), is responsible for more than 70% of the

national energy consumption (in form of fuelwood and other biomass sources), and is overwhelmingly (roughly 90%) dependent on rainfed agricultural practices.

Some of the root causes for the growing vulnerability of Sudan's farmer/pastoralist communities to climate change include ongoing practices that are not compatible with increasing climatic variability regarding crop selection, water resource management, communal rangeland management, drought preparedness, and household income generation. In addition to this, there is a lack of awareness, technical capacities and knowledge to make informed decisions.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The major objective of the project is to implement an urgent set of measures that will minimize and reverse the food insecurity and enhance the adaptive capacity of small-scale farmers and pastoralists resulting from climate change, including variability.

In meeting this objective, the Government of Sudan has prepared a project proposal, which aims to implement key adaptation activities across three key areas identified in the NAPA as urgent and immediate priorities and which are intimately linked to food security, namely: a) water resource management; b) rainfed agricultural production, and, c) rangeland productivity.

Specifically, the project includes 2 components: one which pilots priority adaptation measures identified in the NAPA in 5 vulnerable regions across Sudan, and one which aims to strengthen institutional and individual capacities to implement climate risk management responses in the agriculture sector.

The priority measures that have emerged from the NAPA consultation for improving food security in the face of climate change include improved water harvesting techniques, heat resistant plant varieties, new commercial crops, improved small-scale irrigation techniques, wind barriers, intensification of trees planting along irrigation channels, rehabilitation of vegetation cover and communal rangelands for enhancing livestock resilience.

Building institutional and individual capacity to implement climate change adaptation and risk management involves the implementation of activities that build capacity in federal and state-level institutions regarding the incorporation of short and long term climate change risks into

ongoing and future national development planning processes, and which also build capacity at the local community level to understand how to effectively respond to changing climatic conditions through early warning systems and alternative production strategies that are responsive to the particular food security threat forecasted.

SYNERGIES AND COORDINATION

The adaptation activities are to be undertaken in close synergy with the National Strategic Plan for Sudan, which provides a framework for focusing, and coordinating Sudan's development efforts over the next five years. The project also has strong resonance with two remarkable GEF regional initiatives dealing with sustainable water and land resources management in Sudan: the WB/UNDP Nile Basin Initiative (NTEAP II) on the one hand and the Terr'Africa SIP on the other hand. The project will establish close links with these two programmes through setting up flexible coordination and collaboration mechanisms, knowledge and information sharing as well as joint programming whenever suitable/possible.

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TUVALU

INCREASING RESILIENCE OF COASTAL AREAS AND COMMUNITY SETTLEMENTS TO CLIMATE CHANGE

LDCF project grant: \$3,000,000

Co-financing: \$3,080,000

NAPA completion date: October, 2007

**Inclusion into LDCF Work Program:
August 2008**

**CEO endorsement date: August 2009
(expected)**

**Implementation start: October 2009
(expected)**

Tuvalu is comprised of four reef islands and five atolls, and is located in the South Pacific. And because of its location Tuvalu is on the front lines of adaptation because it is already experiencing the impacts of climate change. There is a notable increase in the frequency and intensity of extreme hydro-meteorological events as well as the climate change-related accelerated rise of sea level. These events have an adverse impact on the low lying islands of Tuvalu. With a coastline which is less 1 metre above sea level, these events erode the Country's very scarce land resources and increases the salinity of groundwater lenses. The consequence is that freshwater availability is decreasing and agricultural yields are decreasing.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

The project will implement effective community-based adaptation measures in coastal areas that

reduce vulnerability and improve adaptive capacity to climate change and sea level rise. The project will use demonstration measures aligned with local conditions, which will encompass community-based systems for the management of protective ecosystems, sustainable use of climate-sensitive natural resources and diversification of vulnerable livelihoods. Envisaged demonstration projects will focus on opportunities for community-based afforestation, mangrove regeneration and plantation management, erosion prevention and participative protection of coastal sediment barriers, reduction of man-made stresses on coral reefs and protective ecosystems, diversification of crops and agricultural practices, optimisation of freshwater and irrigation management, and improved information flows in climate information and early warning systems.

The project will also enable a strategic revision of national and sub-national policies and programs to incorporate climate change risk considerations and adaptation strategies into financial decision processes, and to develop co-ordination and harmonization amongst different sectoral interventions. The project will enhance the adaptive capacity of local communities to anticipate dynamic climate-related threats and protect their livelihoods, as well as improving the Individual, institutional and systemic capacity at all levels of public administration to plan for and respond to climate change risks in coastal areas.

ZAMBIA

ADAPTATION TO THE EFFECTS OF DROUGHT AND CLIMATE CHANGE IN AGRO-ECOLOGICAL ZONE 1 AND 2 IN ZAMBIA

LDCF project grant: \$3,450,000

Co-financing: \$7,000,000

NAPA completion date: October, 2007

**Inclusion into LDCF Work Program:
September, 2008**

**CEO endorsement date: August 2009
(expected)**

**Implementation start: September, 2009
(expected)**

Zambia is already dealing with the early impacts of climate change. Since the late 1980s, there has been a tendency for the later onset and earlier withdrawal of rains, as well as more frequent droughts. In the last seven years of this decade, Zambia has had droughts in the rainy seasons of 2000/01, 2001/02 and 2004/5. Floods are becoming more widespread too: over half of Zambia's districts were affected in the last few years – 2005/6, 2006/7 and 2007/8 being the most recent - some for the first time in history. The impacts of these droughts and floods have been severe: crop failure, outbreaks of human and animal diseases, displacement of human populations and destruction of property and infrastructure. In 2004/5 and 2006/7, the affected population sizes were 1.2 m and 1.4m people respectively.

With very little infrastructure for water collection, Zambia is overwhelmingly dependent on rainfall. Water needs are met through boreholes and wells where available, or alternatively, rivers. Less than 5% of arable land is under irrigation. Climate change projections outlined in the NAPA point to an increase in temperature and a change in patterns of rainfall, leading to prolonged droughts and localized flooding.

Experience shows that key crop varieties, such as maize, would not mature due to the shortening of the growing season in the southernmost part of the country, undermining food security in the region. Assessments of the economic costs of climate change on agriculture in Zambia have indicated that future climatic conditions in the southern regions will cause strong water deficits at critical periods of the cropping calendars, resulting in severe yield decreases for specific crops such as maize.

The NAPA has highlighted that due to the shortening of the rainy season and higher seasonal temperatures, areas suitable for staple crops such as maize are likely to fall by more than 80%. Climate change is super-imposed on unsustainable land-use practices such as forest clearing for agriculture and charcoal production, which, combined with poor livestock management systems, have caused severe land degradation. Temperature increases are also likely to degrade the quality of rangeland for cattle, thereby leading to reduced productivity of cattle, which provides the main source of livelihood and draught power in many of the southernmost provinces.

PROJECT ACTIVITIES AND EXPECTED IMPACTS

This LDCF project supports climate-resilient water management and agricultural practices, primarily focused on the very vulnerable southern regions. The project's basic starting point is to improve the capacity to supply and use climate risk information for seasonal climate risk management. An early warning system is already in place to communicate climate risk information to the Ministry of Agriculture, but has two key weaknesses: a) outreach to farmers, water managers, extension officers and other relevant

stakeholders (including packaging the information in an accessible format) b) the links between the Ministry of Agriculture and the District authorities.

The project addresses each of these barriers and works to improve the capacity to conduct and apply climate risk assessments to planning processes through the following activities:

1. Working with the Meteorological Service, Ministry of Agriculture, and other relevant government ministries and research institutions to improve seasonal weather forecasts in order to reach a satisfactory level of predictive skill for application by decision-makers, government planners, and farmers;
2. Training farmers, agricultural planners and water managers to use climate information in water and land management practices;
3. Adapting early warning systems so that they communicate climate risk information effectively to user groups.
4. Conducting an economic impact assessment of the adaptation value of using climate risk information to adapt agricultural planning. Building on this platform of improved quality climate information disseminated and packaged to relevant stakeholders, the project implements local adaptation pilots in the agriculture and water management sectors including, among others, technologies to capture and store rainfall, soil protection techniques, water conservation techniques, and test planting of climate resilient varieties. The pilots demonstrate the cost-effectiveness of different adaptation options, and subsequently measure yields, income changes, transaction costs and acceptability by farmers, with a view to making the case for planning, policy and budgetary adjustments.

Additionally, the demonstration pilots are set up to test adaptation 'hypotheses' agreed by stakeholders during the project preparation phase, e.g. a) early

maturing crop varieties is a cost-effective adaptation; b) appropriate agricultural water management improves yields of traditional crop varieties; c) integrated land management seeking to avoid cultivation, deforestation and construction along river banks is an effective adaptation measure against flooding; and d) keeping sufficient food stocks is an effective tool to mitigate the impacts of poor harvest years.

Using the above outputs, the final leg of the project focuses on constructing a case for adjustments to the most influential national strategies and policies. A central part of this case will evolve around information on the economic value of adaptation investments. The project will, therefore, develop a detailed proposal on the government regulatory and fiscal support needed to scale up adaptation interventions. National dialogues are then organized to debate the project findings. Building on the existing national efforts, the project contributes to building the capacity for documenting lessons learnt and establishment of a mechanism for replication and initiates policy dialogue for formulation and review of policy and legal frameworks for adaptation initiatives.

SYNERGIES AND COORDINATION

The project interventions are attached to, and seek synergy with, many existing agricultural sector programmes already under implementation in Zambia, but not yet taking into consideration the impacts of CC on the success of their outcomes. This assures that the LDCF activities, while relatively limited in scope and scale, have a wide impact across the agriculture and water management sectors through learning, mainstreaming and upscaling of successful pilot adaptation measures. Coordination and synergies are therefore being pursued with specific programmes and projects currently being implemented in the following sectors: a) irrigation development, b) agricultural infrastructure, c) livestock development and productivity, d) agricultural technology development and dissemination, e) fertilizer support, and f) conservation tillage and moisture conservation.

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