

# Least Developed Countries Fund



**GLOBAL ENVIRONMENT FACILITY**  
INVESTING IN OUR PLANET





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Climate change is real. Accumulating evidence shows that people, through increasing greenhouse-gas emissions, are changing the world's climate. Global surface temperatures are on the increase, sea levels continue to rise, and glaciers and Arctic sea ice are shrinking.

People across the globe, from all walks of life face increasingly unpredictable weather patterns, as well as more frequent and more intense extreme weather events, resulting in reduced agricultural output, damaged infrastructure, outbreaks of vector-borne disease, and loss of life and livelihoods. Climate change coincides with other, global scarcity trends that will leave future generations with less arable land, clean water, forests and other natural assets to meet growing demands.

Climate change affects worst those least able to respond to its effects, and those least responsible for it. From 1850 to 2006, developing countries had emitted approximately a quarter of energy-related CO<sub>2</sub>, while accounting for more than four fifths of world population in 2006. Meanwhile, in Africa alone, between 75 and 250 million people are projected to be exposed to increased water stress, reducing rain-fed agriculture yields by up to fifty percent in some regions.

Among developing countries, the least developed countries (LDC) include those most vulnerable to climate change. This is why 194 parties to the United Nations Framework Convention on Climate Change agreed to take full account of the special needs of the LDCs. In 2001, the parties decided to establish the Least Developed Countries Fund (LDCF), to be managed by the GEF, with a priority to support the world's most vulnerable countries in their efforts to adapt to the effects of climate change.

To date, the GEF, through the LDCF, has supported 49 LDCs in identifying and addressing their most urgent immediate adaptation needs, by assisting them in the development of National Adaptation Programs of Action, and through a growing portfolio of 78 tangible projects with funds exceeding \$360 million.

These projects represent the most comprehensive and the most advanced program of adaptation in action, comprising innovative approaches and technologies in climate-resilient agriculture, water resources management, coastal protection, disaster risk management, and public health, at different scales and in different social and economic settings. The LDCF presents a unique opportunity for learning and it will be instrumental in informing adaptation policy, planning and action at greater scale and for the long term. Our experience shows that we can translate our knowledge of climate change into practical solutions for adaptation, tailored to the specific needs and circumstances of LDCs.

In Bhutan, a pioneering LDCF project has reduced the risk of glacial-lake outburst floods for 21 vulnerable communities through a controlled, artificial drainage effort at one of the country's most dangerous glacier lakes, and by establishing an early warning system in the downstream valley. In Niger, the LDCF helps some of the world's most food-insecure communities cope with the added pressure of climate change, by introducing locally adapted, climate-resilient seeds, improved land and water management practices, and by expanding access to and the use of agro-meteorological information. In Samoa, the LDCF has laid the groundwork for concerted adaptation action at the national level by providing effective early warning information to the agriculture and public health sectors.

Through the projects financed under the LDCF, our goal is to help LDCs become resilient to climate change by integrating adaptation measures across their development policies, plans and programs, at all levels and by all those concerned, including governments, private enterprises, civil society and indigenous peoples. This publication offers an overview of the many ways in which we are pursuing this goal, and we hope these case studies will inform and inspire new ideas and initiatives.

# WHAT IS THE GLOBAL ENVIRONMENT FACILITY



The Global Environment Facility (GEF) unites 182 countries — in partnership with international institutions, nongovernmental organizations (NGOs), and the private sector — to address global environmental issues. An independent financial organization, the GEF provides grants to developing countries and countries with economies in transition for projects related to biodiversity, climate change mitigation and adaptation, international waters, land degradation, the ozone layer, and persistent organic pollutants. These projects benefit the global environment and promote sustainable livelihoods.

Since 1991, the GEF has achieved a strong track record with developing countries and countries with economies in transition, providing \$10.5 billion in grants and leveraging \$51 billion in cofinancing for over 2,700 projects in over 165 countries. Through its Small Grants Programme (SGP), the GEF has also made more than 14,000 small grants directly to civil society and community-based organizations, totaling \$634 million.

The GEF partnership includes 10 agencies: African Development Bank (AfDB); Asian Development Bank (ADB); European Bank for Reconstruction and Development (EBRD); Inter-American Development Bank (IDB); International Fund for Agriculture Development (IFAD); UN Development Programme (UNDP); UN Environment Programme (UNEP); UN Food and Agriculture Organization (FAO); UN Industrial Development Organization (UNIDO); and World Bank. The Scientific and Technical Advisory Panel (STAP) oversees the technical and scientific quality of the GEF's policies and projects.

In 2001, during the seventh Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in Marrakesh, the Convention established the Least Developed Countries Fund (LDCF). The Least Developed Countries Fund aims at addressing and financing the special needs of Least Developed Countries (LDCs) under the Climate Convention and prioritizes the preparation and implementation of the National Adaptation Programs of Action (NAPAs).

NAPAs are country-driven strategies that identify urgent and most immediate needs of Least Developed Countries to adapt to climate change. So far NAPAs have identified food security and agriculture as the most urgent and immediate priority areas. NAPA implementation entails concrete adaptation actions and investments in core development sectors. Any Least Developed Country who is a party to the Climate Convention and has completed its NAPA is eligible for project funding.

Today, with over a half billion dollars of voluntary contributions from donors, the Least Developed Countries Fund holds the largest portfolio of adaptation projects in the least developed countries. As of September 2012, the Fund had approved \$353.66 million for the funding of 78 projects and programs, leveraging \$1.65 billion in cofinancing. This figure is increasing continuously, as projects are submitted and approved on a rolling basis at the GEF. The Fund applies a streamlined procedure—including principles, modalities, and criteria to access the funds—that meets the needs of the Least Developed Countries. Therefore, projects are fully aligned with these countries NAPAs. Least Developed Countries Fund has funded the preparation of 49 NAPAs, of which 47 have been completed, even though these countries include some of the poorest in the world, and thus the least capable of adapting to the adverse effects of climate change.

The Least Developed Countries have made impressive progress in reducing their vulnerability to climate change. They are now positioned to provide examples of concrete adaptation actions experience

and share lessons learned with other countries around the world. The supported projects cut across a variety of themes and geographies. In Malawi, for example, Least Developed Countries Fund interventions are implementing practical community-level adaptation actions that improve resilience of the agriculture sector, while boosting community economic development. In Niger, where land degradation, water scarcity, and at-risk livestock pose a deadly threat to rural communities, the Least Developed Countries Fund is supporting a climate-resilient approach to farming through adaptation practices such as distribution of drought-resilient crops seeds, and locally appropriate water-harvesting techniques. In Bangladesh, a combination of smart planning and coastal afforestation programs are serving to lessen the climatically-aggravated risks of floods, droughts, cyclones, and erosion. On the other side of the spectrum, adaptation in vulnerable small island states such as Samoa, has resulted in the installation of automated weather stations and development of crop suitability maps and other tools. All of these are helping increase food and water security, while reducing damage from weather-related disasters and increasing burden of tropical disease.

## LDCs and the UNFCCC

The United Nations identifies 49 countries as belonging to the group of Least Developed Countries (LDCs), based on three criteria: low income, weak human assets, and high economic vulnerability. The UNFCCC recognizes the special situation of LDCs:

*"The Parties shall take full account of the specific needs and special situations of the Least Developed Countries in their actions with regard to funding and transfer of technology"*

—(Article 4.9)







# Ten Key Achievements of the Least Developed Countries Fund

1. The Least Developed Countries Fund has raised more than a half billion dollars reached thanks to the voluntary contributions from 25 donor countries.
2. Since its inception, the Fund has supported the preparation of 49 NAPAs, of which 47 have been completed. NAPAs for Myanmar and Somalia are In their final stages of preparation.
3. As of September 2012, 42 projects have started implementing concrete adaptation actions on the ground, generating life-saving benefits to some of the world's poorest and most vulnerable communities.
4. The Least Developed Countries Fund has a streamlined project cycle: projects are approved on a rolling basis and projects smaller than \$2 million can be approved in one step.
5. As of September 2012, the Fund has approved 77 projects and 1 program<sup>1</sup> in 45 countries, totaling \$353.66 million and leveraging more than \$1 billion in cofinancing.
6. Fifty-nine percent of the approved projects are in Africa, 18 percent in Asia, and 23 percent in small island development states (SIDS).<sup>2</sup>
7. Main sectors targeted are food security and agriculture (30 percent), early warning systems (24 percent), and water resources (17 percent).
8. The first multitrust fund, multi focal area programmatic approach project with Fund resources was approved in 2011, in order to scale-up regional adaptation benefits: *Sahel and West Africa Program Supporting the Great Green Wall Initiative* (GGWI), implemented by the World Bank.
9. Projects follow a community participation approach at the grassroots level, emphasizing cost-efficiency and country ownership, ensuring the projects' sustainability, scale-up, and replication.
10. Eighty-five percent of the Fund projects on the ground have proven to achieve their adaptation objectives in a satisfactory manner, as rated by projects' implementing agencies.

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1 This program includes four child projects under *Sahel and West Africa Program Supporting the Great Green Wall Initiative* (GGWI), two of which are currently under implementation. See pg. 80.

2 Small island development states category includes two projects in Haiti (Latin America and Caribbean Region).

**TABLE 1: NATIONAL ADAPTATION PROGRAMS OF ACTION (NAPAS) COMPLETED**

Country	Date NAPA submitted to UNFCCC	Country	Date NAPA submitted to UNFCCC
Afghanistan	Sep-09	Madagascar	Dec-06
Angola	Dec-11	Malawi	Mar-06
Bangladesh	Nov-05	Maldives <sup>2</sup>	Mar-08
Benin	Jan-08	Mali	Dec-07
Bhutan	May-06	Mauritania	Nov-04
Burkina Faso	Dec-07	Mozambique	Jul-08
Burundi	Feb-07	Nepal	Nov-10
Cambodia	Mar-07	Niger	Jul-06
Cape Verde <sup>1</sup>	Dec-07	Rwanda	May-07
Central African Republic	Jun-08	Samoa	Dec-05
Chad	Feb-10	São Tomé and Príncipe	Nov-07
Comoros	Nov-06	Senegal	Nov-06
Democratic Republic of Congo	Sep-06	Sierra Leone	Jun-08
Djibouti	Oct-06	Solomon Islands	Dec-08
Eritrea	May-07	Sudan	Jun-07
Ethiopia	Jun-08	Tanzania	Sep-07
The Gambia	Jan-08	Timor-Leste	Sep-11
Guinea	Jul-07	Togo	Sep-09
Guinea-Bissau	Feb-08	Tuvalu	May-07
Haiti	Dec-06	Uganda	Dec-07
Kiribati	Jan-07	Vanuatu	Dec-07
Lao People's Democratic Republic	May-09	Yemen	Apr-09
Lesotho	Jun-07	Zambia	Oct-07
Liberia	Jul-07		

<sup>1</sup> Cape Verde graduated from the list of least developed countries on December 20, 2007.

<sup>2</sup> Maldives graduated from the list of least developed countries on January 1, 2011.



**TABLE 2: PROJECTS APPROVED UNDER THE LEAST DEVELOPED COUNTRIES FUND<sup>1</sup>**

	Country	Project Title	Agency	GEF Total Costs (USD)	Total Co-financing (USD)	Status
1	Bangladesh	Community Based Adaptation to Climate Change through Coastal Afforestation	UNDP	3,740,000	7,100,000	Under Implementation
2	Bhutan	Reducing Climate Change-induced Risks and Vulnerabilities from Glacial Lake Outbursts in the Punakha-Wangdi and Chamkhar Valleys	UNDP	3,987,555	4,036,224	Under Implementation
3	Sudan	Implementing NAPA Priority Interventions to Build Resilience in the Agriculture and Water Sectors to the Adverse Impacts of Climate Change	UNDP	3,740,000	3,500,000	Under Implementation
4	Cape Verde	Building Adaptive Capacity and Resilience to Climate Change in the Water Sector in Cape Verde	UNDP	3,410,000	63,699,027	Under Implementation
5	Burkina Faso	Strengthening Adaptation Capacities and Reducing the Vulnerability to Climate Change in Burkina Faso	UNDP	3,300,000	20,094,595	Under Implementation
6	Malawi	Climate Adaptation for Rural Livelihoods and Agriculture (CARLA)	AfDB	3,601,923	6,288,000	Under Implementation
7	Tuvalu	Increasing Resilience of Coastal Areas and Community Settlements to Climate Change	UNDP	3,696,000	4,500,000	Under Implementation
8	Djibouti	Implementing NAPA Priority Interventions to Build Resilience in the most Vulnerable Coastal Zones in Djibouti	UNEP	2,359,500	2,405,000	Under Implementation
9	Zambia	Adaptation to the effects of drought and climate change in Agro-ecological Zone 1 and 2 in Zambia	UNDP	4,284,500	9,804,000	Under Implementation
10	Sierra Leone	Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone	IFAD	3,019,280	8,626,000	Under Implementation
11	Haiti	Strengthening Adaptive Capacities to Address Climate Change Threats on Sustainable Development Strategies for Coastal Communities in Haiti	UNDP	3,960,000	9,780,000	Under Implementation
12	Benin	Integrated Adaptation Programme to Combat the Effects of Climate Change on Agricultural Production and Food Security	UNDP	3,839,000	7,879,900	Under Implementation
13	Congo DR	Building the Capacity of the Agriculture Sector in DR Congo to Plan for and Respond to the Additional Threats Posed by Climate Change on Food Production and Security	UNDP	3,410,000	4,050,000	Under Implementation

<sup>1</sup> Projects are listed in the order of first submission to the GEF Secretariat.

	Country	Project Title	Agency	GEF Total Costs (USD)	Total Co-financing (USD)	Status
14	Vanuatu	Increasing Resilience to Climate Change and Natural Hazards	World Bank	3,000,000	3,150,000	Council Approved
15	Guinea	Increased Resilience and Adaptation to Adverse Impacts of Climate Change in Guinea's Vulnerable Coastal Zones	UNDP	3,377,000	162,885,000	Under Implementation
16	Samoa	Integrating Climate Change Risks into the Agriculture and Health Sectors in Samoa	UNDP	2,255,000	2,100,000	Under Implementation
17	Mali	Enhancing Adaptive Capacity and Resilience to Climate Change in the Agriculture Sector in Mali	UNDP	2,684,000	8,477,300	Under Implementation
18	Rwanda	Reducing Vulnerability to Climate Change by Establishing Early Warning and Disaster Preparedness Systems and Support for Integrated Watershed Management in Flood Prone Areas	UNEP	3,999,600	12,427,000	Under Implementation
19	Maldives	Integrating Climate Change Risks into Resilient Island Planning	UNDP	4,999,500	4,851,211	Under Implementation
20	Liberia	Enhancing Resilience of Vulnerable Coastal Areas to Climate Change Risks	UNDP	3,300,000	4,653,420	Under Implementation
21	Cambodia	Promoting Climate-Resilient Water Management and Agricultural Practices	UNDP	2,145,000	2,240,350	Under Implementation
22	Lesotho	Improvement of Early Warning System to Reduce Impacts of Climate Change and Capacity Building to Integrate Climate Change into Development Plans	UNEP	1,963,500	2,721,500	Under Implementation
23	Mauritania	Support to the Adaptation of Vulnerable Agricultural Production Systems	IFAD	3,960,000	10,473,000	Under Implementation
24	Niger	Implementing NAPA Priority Interventions to Build Resilience and Adaptive Capacity of the Agriculture Sector to Climate Change	UNDP	3,860,000	10,950,000	Under Implementation
25	Mali	Integrating Climate Resilience into Agricultural Production for Food Security in Rural Areas	FAO	2,400,000	4,500,000	Under Implementation
26	Yemen	Integrated Coastal Zone Management	World Bank	4,950,000	10,000,000	Council Approved
27	Comoros	Adapting Water Resource Management in Comoros to Increase Capacity to Cope with Climate Change	UNDP/ UNEP	4,224,000	9,316,318	Under Implementation
28	Guinea-Bissau	Strengthening Resilience and Adaptive Capacity to Climate Change in Guinea-Bissau's Agrarian and Water Sectors	UNDP	4,543,000	19,954,431	Under Implementation



	Country	Project Title	Agency	GEF Total Costs (USD)	Total Co-financing (USD)	Status
29	São Tomé and Príncipe	São Tomé and Príncipe Adaptation to Climate Change	World Bank	4,873,330	13,173,600	Under Implementation
30	Lao PDR	Improving the Resilience of the Agriculture Sector in Lao PDR to Climate Change Impacts	UNDP	4,999,995	7,718,548	Under Implementation
31	Kiribati	Increasing Resilience to Climate Variability and Hazards	World Bank	3,300,000	7,800,000	Under Implementation
32	Tanzania	Developing Core Capacity to Address Adaptation to Climate Change in Productive Coastal Zones	UNEP	3,801,930	67,828,498	Under Implementation
33	Samoa	Integration of Climate Change Risk and Resilience into Forestry Management (ICCRIFS)	UNDP	2,695,000	2,530,000	Under Implementation
34	Ethiopia	Promoting Autonomous Adaptation at the community level in Ethiopia	UNDP	5,950,323	24,721,020	Under Implementation
35	Liberia	Enhancing Resilience to Climate Change by Mainstreaming Adaption Concerns into Agricultural Sector Development in Liberia	UNDP	2,702,040	6,345,122	Under Implementation
36	Senegal	Climate Change adaptation project in the areas of watershed management and water retention	IFAD	5,632,000	10,175,000	Under Implementation
37	Burundi	Enhancing Climate Risk Management and Adaptation in Burundi (ECRAMB)	AfDB	3,526,171	15,660,000	Council Approved
38	Mozambique	Adaptation in the coastal zones of Mozambique	UNDP	4,976,400	9,677,000	Under Implementation
39	Afghanistan	Building Adaptive Capacity and Resilience to Climate Change in Afghanistan.	UNEP	5,500,000	16,000,000	Council Approved
40	São Tomé and Príncipe	Strengthening the Adaptive Capacity of Most Vulnerable São Tomé and Príncipe's Livestock-keeping Households	AfDB	2,321,275	7,650,000	Council Approved
41	Central African Republic	Integrated Adaptation Programme to Combat the Effects of Climate Change on Agricultural Production and Food Security in CAR	UNDP	3,135,000	5,560,000	Council Approved
42	Cambodia	Vulnerability Assessment and Adaptation Programme for Climate Change in the Coastal Zone of Cambodia Considering Livelihood Improvement and Ecosystems	UNEP	1,853,500	4,195,000	Under Implementation

Country	Project Title	Agency	GEF Total Costs (USD)	Total Co-financing (USD)	Status
43 Haiti	Strengthening climate resilience and reducing disaster risk in agriculture to improve food security in Haiti post earthquake	FAO	2,999,700	9,329,724	Under Implementation
44 The Gambia	Strengthening of The Gambia's Climate Change Early Warning Systems	UNEP	1,164,350	1,555,000	Under Implementation
45 Regional	Sahel and West Africa Program in Support of the Great Green Wall Initiative	World Bank	16,000,000	261,000,000	Council Approved
46 Maldives	Increasing Climate Change Resilience of Maldives through Adaptation in the Tourism Sector	UNDP	1,815,481	1,650,438	Under Implementation
47 Nepal	Community Based Flood and Glacial Lake Outburst Risk Reduction	UNDP	6,999,850	18,900,000	Council Approved
48 Lao PDR	Effective Governance for Small Scale Rural Infrastructure and Disaster Preparedness in a Changing Climate	UNDP	5,302,000	25,927,478	Council Approved
49 Cambodia	Strengthening the adaptive capacity and resilience of rural communities using micro watershed approaches to climate change and variability to attain sustainable food security	FAO	5,607,800	18,805,395	Council Approved
50 Togo	Adapting Agriculture Production in Togo (ADAPT)	IFAD	6,000,000	13,000,000	Council Approved
51 Malawi	Shire Natural Ecosystems Management Project	World Bank	1,650,000	11,736,000	Under Implementation
52 Lesotho	Adaptation of Small-scale Agriculture Production (ASAP)	IFAD	4,892,074	13,000,000	Council Approved
53 Timor Leste	Strengthening the Resilience of Small Scale Rural Infrastructure and Local Government Systems to Climatic Variability and Risk	UNDP	5,192,000	24,527,763	Council Approved
54 Tuvalu	Effective and Responsive Island-level Governance to Secure and Diversify Climate Resilient Marine-based Coastal Livelihoods and Enhance Climate Hazard Response Capacity	UNDP	4,757,500	19,601,596	Council Approved
55 Bangladesh	Integrating Community-based Adaptation into Afforestation and Reforestation Programs in Bangladesh	UNDP	6,270,000	41,619,000	Council Approved
56 Guinea	Strengthening farmers communities livelihoods resilience against climate changes in the Guinean Prefectures of Gaoual, Koundara and Mali	UNDP	4,190,000	50,630,000	Council Approved



	Country	Project Title	Agency	GEF Total Costs (USD)	Total Co-financing (USD)	Status
57	Sierra Leone	Building adaptive capacity to catalyze active public and private sector participation to manage the exposure and sensitivity of water supply services to climate change in Sierra Leone	UNDP	3,311,000	25,600,000	Council Approved
58	The Gambia	Enhancing Resilience of Vulnerable Coastal Areas and Communities to Climate Change in the Republic of The Gambia	UNDP	9,955,000	41,388,000	Council Approved
59	Niger	Scaling up Community-Based Adaptation (CBA) in Niger	UNDP	4,180,000	13,250,000	Council Approved
60	Rwanda	Landscape Approach to Forest Restoration and Conservation (LAFREC)	World Bank	4,449,500	19,560,000	Council Approved
61	Bhutan	Addressing the risk of climate-induced disasters through enhanced national and local capacity for effective actions	UNDP	12,750,320	45,798,000	Council Approved
62	Tanzania	Strengthening climate information and early warning systems in Tanzania to support climate resilient development	UNDP	4,510,000	19,790,000	Council Approved
63	Ethiopia	Strengthening climate information and early warning systems in Ethiopia to support climate resilient development	UNDP	5,500,000	20,750,000	Council Approved
64	Malawi	Strengthening climate information and early warning systems in Malawi to support climate resilient development	UNDP	4,510,000	17,136,749	Council Approved
65	Malawi	Climate Proofing Local Development Gains in Rural and Urban Areas of Machinga and Mangochi Districts	UNDP	6,015,020	36,000,000	Council Approved
66	Solomon Islands	Solomon Islands Water Sector Adaptation Project (SIWSAP)	UNDP	7,700,000	40,255,000	Council Approved
67	Uganda	Strengthening climate information and early warning systems in Uganda to support climate resilient development	UNDP	4,510,000	23,664,000	Council Approved
68	Zambia	Strengthening climate information and early warning systems in Zambia to support climate resilient development	UNDP	4,400,000	23,710,000	Council Approved

Country	Project Title	Agency	GEF Total Costs (USD)	Total Co-financing (USD)	Status
69 Benin	Strengthening Climate Information and Early Warning Systems in Western and Central Africa for Climate Resilient Development and Adaptation to Climate Change - Benin	UNDP	4,510,000	18,087,302	Council Approved
70 Burkina Faso	Strengthening Climate Information and Early Warning Systems in Western and Central Africa for Climate Resilient Development and Adaptation to Climate Change - Burkina Faso	UNDP	4,510,000	24,305,000	Council Approved
71 São Tomé and Príncipe	Strengthening Climate Information and Early Warning Systems in Western and Central Africa for Climate Resilient Development and Adaptation to Climate Change -	UNDP	4,510,000	17,850,000	Council Approved
72 Sierra Leone	Strengthening Climate Information and Early Warning Systems in Western and Central Africa for Climate Resilient Development and Adaptation to Climate Change - Sierra Leone	UNDP	4,510,000	18,389,000	Council Approved
73 Samoa	Enhancing the Resilience of Tourism-Reliant Communities to Climate Change Risks	UNDP	2,200,000	7,100,000	Council Approved
74 Liberia	Strengthening Liberia's Capability to Provide Climate Information and Services to Enhance Climate Resilient Development and Adaptation to Climate Change.	UNDP	7,513,000	28,428,289	Council Approved
75 Comoros	Enhancing Adaptive Capacity and Resilience To Climate Change in the Agriculture Sector in Comoros	UNDP	10,000,000	35,000,000	Council Approved
76 Niger	Integrating climate resilience into agricultural and pastoral production for food security in vulnerable rural areas through the Farmers Field School approach	FAO	4,180,000	15,200,000	Council Approved
77 Burkina Faso	Reducing vulnerability of natural resource dependent livelihoods in two landscapes at risk of the effects of climate change in Burkina Faso: Boucles du Mouhoun Forest Corridor and Mare d'Oursi Wetlands Basin	UNDP	7,700,000	21,407,000	Council Approved
78 Madagascar	Adapting Coastal Zone Management to Climate Change in Madagascar Considering Ecosystem and Livelihood Improvement	UNEP	6,013,865	11,965,000	Council Approved
<b>Total</b>			<b>353,663,782</b>	<b>1,655,411,798</b>	









## Community based adaptation to climate change through coastal afforestation

### Country Background and Vulnerabilities

In Bangladesh, many communities are situated close to the shoreline and are reliant on agriculture and fishing for their livelihoods. Rising sea levels and changes in the frequency and intensity of tropical cyclones are raising the incidences and severity of flooding, salt water intrusion and erosion, not to mention loss of livelihoods, shelter and life.

### Project Activities and Expected Impacts

Given these circumstances, the government of Bangladesh is implementing a project to reduce the vulnerability of communities in five coastal districts most susceptible to the effects of climate change. In partnership with the government of Bangladesh, the UNDP is working to enhance the resilience of coastal communities as well as introduce new options for income generation.

The project is implementing community-based climate risk reduction measures in targeted communities that are especially vulnerable to climate change. In particular, the project is working to accomplish the following:

- Ensure that buffer zone measures promoted by ongoing projects take anticipated climate change risks into account.
- Facilitate diversification of livelihoods and alternative employment opportunities in order to reduce threats to existing and new coastal buffer zones and make longer term protective measures viable.

- Develop secure sources of potable water for communities vulnerable to saline intrusion as a result of frequent climate-induced flooding. Innovative mechanisms such as rainwater harvesting, micro surface and ground water treatment facilities will be piloted and demonstrated for up-scaling over time.
- Develop capacities at the national and community levels to better integrate climate change risk into development planning processes.
- Train and policy makers at the national level to integrate climate risks into coastal zone planning and ensure that priorities outlined in the National Communications to the UNFCCC and in the NAPA can be appropriately addressed.
- Integrate climate change risks into legislation related to coastal zoning regulations and facilitate alignment of existing coastal management programs toward stronger integration and climate resilience.
- Ensure that information flows are improved between climate monitoring, forecasting and early warning services to communities in coastal areas.



## Reducing climate change induced risks and vulnerabilities from glacial lake outbursts in the Punakha-Whangdi and Chamkhar valleys

### Country Background and Vulnerabilities

Bhutan, a landlocked, mountainous country, is with perceptual snow and glaciers covering 7.5 percent of the country. A significant hazard is formation of supra-glacial lakes because of the accelerated retreat of glaciers. Rising mean temperatures, attributable to climate change, are causing glacial retreat and are correlated with faster rates of glacier melt. The melting ice from these receding glaciers is increasing the volume of water in glacial lakes, and the melting of ice-cored dams is destabilizing them, pushing the risk for glacial lake outburst floods to critical levels.

With a majority of Bhutan's population and economic activities in large river valleys, climate-induced glacial lake outbursts floods could cause colossal human and economic devastations. Furthermore, many hydropower projects are located downstream in these sub-basins. Glacial lake outbursts floods events would take a huge toll on hydropower investments and revenue. Agricultural land is also extremely vulnerable to flood impacts.

### Project Activities and Expected Impacts

This project seeks to enhance adaptive capacity to prevent climate change-induced glacial lake outbursts floods disasters in Bhutan, particularly in the Punakha-Wangdi and Chamkhar valleys. It also aims to support the Royal Government of Bhutan to integrate long-term climate change-induced risk reduction planning and management into the existing disaster management framework and practices.

This project integrates climate risk projections into existing disaster risk management practices and implements corresponding capacity development measures at the national, district and community levels. It aims to demonstrate glacier lakes with a worst-case-scenario outburst projection. The project also seeks to ensure that the existing early warning system in the Punakha-Wangdi valley is upgraded to take sufficient account of this growing risk of climate change-induced glacial lake outbursts floods.

Making progress toward risk reduction from one of Bhutan's most dangerous glacier lakes, the project has successfully lowered Lake Thorthormi by 3.63 meters in total by the end of 2011, however, aims toward a five meter level reduction achieved by the end of project.

An interim manually operated early warning system is operational based on focal persons equipped with mobile phones in 21 particularly vulnerable communities downstream along the Punatsangchu River in the Punakha-Wangdue valley. Awareness of glacial lake outbursts floods and floods has been promoted through the national newspapers and broadcasting services. In terms of capacity development, the project has established district disaster management committees in all three districts covered by the project area. These committees have been trained in community-based disaster risk management and glacial lake outbursts floods risk management.

At the policy level, the project has enabled the formulation of a disaster risk management bill for Bhutan and the completion of glacial lake outbursts floods hazard zoning.





## Implementing NAPA priority interventions to build resilience in the agriculture and water sectors to the adverse impacts of climate change

### Country Background and Vulnerabilities

In Sudan, average annual temperature is predicted to increase 0.8-1.7 °C by 2030, accompanied by increasing rainfall variability particularly during the rainy season. Agro-climatic zones will shift southward, rendering small-scale farmers 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. Some of the root causes for the growing vulnerability of Sudan's farmers 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.

Regarding potential barriers to adaptation, the current policy framework in Sudan for promoting food security is not ensuring provision of safe water supplies at the level of rural areas, towns, and migrating tribes routes. The latter is particularly important for improving rangeland utilization and for the reduction and avoidance of conflicts and frictions between farmers and herders.

### Project Activities and Expected Impacts

The overall goal of this project is to contribute to reduce the vulnerability and increase the adaptive capacity of Sudan's agriculture and water sectors to climate change impacts. The major objective of the project is to implement an urgent set of measures that 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 project 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: (i) water resource management; (ii) rainfed agricultural production, (iii) rangeland productivity. In addition, the project aims to promote the mainstreaming of short-term climate risks into policy and planning frameworks, enhance institutional capacity building, and implement a monitoring and evaluation (M&E) system to account for lessons learnt. The adaptation activities are 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 is working to increase the resilience to climate of key productive activities through enhancing the ability of small farmers and pastoralists to cope with increasing climate variability. Through the introduction of new management schemes and technologies, it aids in the diversification of household income, promote climate-proof cropping systems, reduce pressure on rangelands resources, and, finally, mitigate the potential for future conflicts over dwindling resources.





## Building adaptive capacity and resilience to climate change in the water sector in Cape Verde

### Country Background and Vulnerabilities

The predominant scarcity of water resources continues to represent one of the most limiting factors for economic development in Cape Verde. Water shortages reduce the probability of a good harvest in rainfed agricultural areas. Water availability is also important for the growth of the tourism sector.

It is worth noting that agriculture in Cape Verde is practiced in rather challenging conditions. Limited arable land is often found on mountain slopes or in valleys (ribeiras), where crops are prone to be washed away by flash floods. Furthermore, the growing and burgeoning urban population in Cape Verde and the expansion of the tourism sector are already significantly increasing the water demand. Groundwater reservoirs are particularly vulnerable to the expected climate change effects of reduced rainfall and surface runoff, since they are recharged by direct infiltration from surface layers.

### Project Activities and Expected Impacts

Since the project inception, local communities have been experimenting pilot adaptation measures for the management of water resources to improve their livelihoods in a sustainable way. A set of techniques for the cost-effective management of water resources will be presented by the project and implemented jointly. About 68,000 inhabitants in municipalities within the pilot sites will directly

benefit from the project. Moreover, given the location of the “Planalto Leste” on Santo Antão Island and the fact that there are multiple water catchments on the island, this number may increase significantly. Other expected benefits include further capacity building to adapt to climate change with regard to the management of water resources.

The project will integrate climate change risks and adaptation measures into key national policies, plans, and programs for water resource management. In addition, small- and medium-scale climate change adaptation practices for water resource management are demonstrated and implemented in selected hydrographical basins. The lessons learned and experiences acquired under the above mentioned actions will be disseminated across Cape Verde and to other countries that experience similar climate change challenges. The range of dissemination tools includes reports, films, documentaries, community radio shows, brochures, newsletters, articles, workshops, and round tables.

This project has been conceived to complement several other projects, programs, and initiatives within the water and related sectors in Cape Verde. The national investment budget includes a series of programs and projects related to integrated water resources management. These projects address sustainable water management, watershed management, information collection and monitoring, construction of small-scale water harvesting mechanisms, and enhancing the management infrastructure. In addition, many international agencies have engaged in related investments.



## Strengthening adaptation capacities and reducing the vulnerability to climate change in Burkina Faso

### Country Background and Vulnerabilities

Burkina Faso's population is mostly rural and has little capacity to adapt to climate change. Impacts of predicted global climate change include the following: (i) temperatures rising at rates higher than global averages; (ii) unpredictable changes in rainfall distribution—affecting the start, end, and duration of the rainy season; and (iii) increase in extreme events, such as drought and storm. Moreover, changes to rainfall patterns will lead to changes in the hydrological regime that will lead, in turn, to changes in water availability, and in turn directly impact the agriculture and farming sectors.

Burkina Faso completed its NAPA, which identified the following vulnerable sectors: agriculture, water, livestock, and forests/biodiversity. The NAPA also identified the most vulnerable groups to be the poor in rural areas, notably the women, the youth, and the small-scale producers. The project responds directly and comprehensively to those urgent needs identified and expressed in the NAPA.

### Project Activities and Expected Impacts

To tackle the challenges identified in the NAPA, this project will enhance Burkina Faso's resilience and adaptation capacity to climate change risks in the agro-sylvo-pastoral sector. This project will demonstrate how adaptive capacity can be strengthened and adaptation secured in six pilot villages. It will broadly build capacity across administrative provinces, and strengthen the national enabling environment. The project will

build upon a baseline consisting of rural development and economic livelihood development in the agriculture, livestock, and agro-forestry sectors. GEF funds are to be complemented by investments cofinanced by government and development partners.

The project's expected outcomes of this project are the following: 1) capacity to plan for and respond to climate change in the agro-sylvo-pastoral sector improved; 2) risk of climate induced impacts on agro-sylvo-pastoral productivity reduced through the testing and adoption of best practices; and 3) knowledge management, dissemination of lessons learned and best practices.

At local levels, the main result of this project is for the six villages to have developed strategies to adapt to climate change. In addition, many of the people in these villages will have implemented or be implementing specific actions to adapt to climate change. This will directly lead to a significant number of people benefitting from increased food and economic security.

At provincial and regional level, this project will have three major impacts: (i) the government agencies and other stakeholders authorities will have had direct experience with an array of proven measures for adapting to climate change. They will be empowered to disseminate these measures to other villages across the region. (ii) The government agencies will have a clear demonstration that the new measures work and are applicable in the local context. (iii) The creation of a strong cadre of experts with the tools necessary for mainstreaming climate change adaptation into agriculture, livestock, and forestry development plans and programs across the region.





## Climate Adaptation for Rural Livelihoods and Agriculture (CARLA)

### Country Background and Vulnerabilities

Malawi is highly vulnerable to climate change, particularly as it relates to agriculture and rural livelihoods. Malawi's vulnerability arises from significant exposure to current climate change, high sensitivity of agriculture and rural livelihoods to these climatic changes, and very little low adaptive capacity at the community and national levels.

Smallholder farmers have reported a wide range of impacts associated with current climate variability, including crops drying before maturity, crop damage resulting from floods, soil degradation, shortage of water, reduction in yield, and consequently food insecurity.

### Project Activities and Expected Impacts

The project will directly address two primary components: 1) Implementing practical community-level climate change adaptation actions that improve resilience and adaptive capacity as it relates to agriculture and livelihoods in vulnerable districts in Malawi; and 2) strengthening the capacity of National/District agencies to support community-based climate change adaptation actions.

Reducing vulnerability of Malawian agriculture to climate will require three critical areas of activity: adaptation of farming systems, improved watershed management, and community economic development. The project has adopted an integrated approach to community-based adaptation, and as such will be developing and piloting new and innovative approaches and

practices. The project chose three communities (each composed of several villages) to implement pilot adaptation measures: Mwakabanga, Kafulama, and Moses.

The community-based planning process is an important and defining feature of the project design, but most effort is focused in implementation of the adaptation actions included in the Community Climate Change Action Plan. The specific adaptation measures include the following:

- Planting drought resistant crops including maize, sorghums, millets, and pigeon pea
- Undertake activities to reduce flooding and stabilize the watercourses by revegetating river and stream margins
- Reduce exposure of cultivated land to seasonal flooding by improving existing barriers through stabilization with vegetation
- Develop limited irrigation for critical growth periods
- Expand processing of agricultural outputs in the community
- Undertake watershed management through revegetation by enclosure and planting of single and multipurpose tree crops
- Intensify livestock production through fodder production
- Intensify cropping on communities' flood plains, including multiseasonal cropping





## Increasing resilience of coastal areas and community settlements to climate change

### Country Background and Vulnerabilities

Tuvalu is experiencing increasing climate change-induced damage to human and economic development, with adverse effects already experienced by its small and dispersed communities living in highly vulnerable, low-lying atoll islands. Tuvalu's natural resource base and livelihood opportunities of its communities are seriously undermined by the combined effects of sea-level rise, increased frequency and intensity of tropical cyclones, rapidly progressing coastal erosion, increasing crop damage, and reductions of fresh water supply. The country's small and dispersed population highly depends on fragile marine and terrestrial environments for sustenance

### Project Activities and Expected Impacts

The project aims to increase the protection of livelihoods in coastal areas in all inhabited islands of Tuvalu from dynamic risks related to climate change and climate variability. Through this initiative, the government will strengthen institutional capacities to identify and address climate change-driven events that systematically increase the vulnerability of island communities. The project's resources will be used to increase the protection of livelihoods in island communities from dynamic climate-related damage based on the following interrelated components: a) Increasing institutional capacity at all levels of public administration, island kaupules, and communities, with policy support to plan for

and respond to climate change-related damage; b) integrating community-based adaptation measures for coastal protection and support to agricultural livelihoods in each island; and c) knowledge capturing, management, and dissemination.

Key outputs of enhancing capacity building of public administration include 1) reflecting climate change risk management in national budget, public sector asset management plans, and a National Development Plan, 2) developing a coastal zone management policy, 3) establishing and training a national climate change advisory board to support community-based adaptation planning and implementation, and 4) creating a national awareness and training campaign for local communities.

Regarding enhanced capacity of local communities, the project will develop community-based adaptation plans for coastal protection, water supply security, and agricultural livelihood sustainability for all islands of Tuvalu. These interventions will encompass: 1) "soft" coastal protection (mangroves, soft structures and techniques, and other model demonstrations as determined by the communities); 2) improvements in the security of household and community water supplies; and 3) improvements in the resilience of local agriculture. A community-based adaptation study for each island will be completed that identifies potential community-based adaptation projects for future implementation.

Concerning the capture, analysis, and dissemination of project knowledge and lessons learned, this project will provide funding for analysis, update, and dissemination of climate risk projections and scenarios.



## Implementing NAPA priority interventions to build resilience in the most vulnerable coastal zones in Djibouti

### Country Background and Vulnerabilities

The Republic of Djibouti is subject to an arid climate and difficult natural conditions. It is highly vulnerable to extreme climate events. The large part of Djibouti's infrastructure and population is located in coastal areas and is therefore particularly at risk from sea level rise and flooding. Sea-level rise could reach up to 39 cm by 2050, leading to significant erosion, potential damage to coastal and port infrastructure, as well as increased risks of flooding and salinization of water through salt water intrusion in depleted aquifers. Fragile coastal ecosystems are already showing significant signs of degradation because of climate change and anthropogenic pressures.

### Project Activities and Expected Impacts

The project will 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. It will help local populations to adapt through the adoption of soft measures for more sustainable production methods, particularly in the areas of water management, agriculture, fisheries and tourism.

The project will contribute to the following adaptation benefits: 1) reduced vulnerability and increased resilience of coastal zone systems, including the protection of important livelihood sources; 2) reduced losses from extreme climatic events and improved information for decision making; 3) reduced vulnerability in targeted

communities, including through the promotion of alternative sources of livelihoods as a climate risk mitigation strategy; 4) increased capacity for adaptive management and enforcement capacity for integrated coastal zone management (ICZM), integrated water resources management (IWRM) and vulnerability reduction; and 5) better capacities for improving freshwater availability for current and future technologies that are adapted to decreased rainfall.

The main component of this project will take a watershed-based approach for the rehabilitation of existing water extraction infrastructure, in order to reduce overexploitation and salinization.

In addition, the project aims to develop an early warning system for floods in the city of Djibouti, including installation of hydroclimatic monitoring stations in the two project sites in order to allow for decentralized early warning and disaster management, specifically with regards to floods and droughts.

Main expected outcomes include: 1) increased capacity for adaptive management and enforcement capacity for ICZM/IWRM and vulnerability reduction; 2) reduced vulnerability and increased resilience of coastal zone systems, including the protection of important livelihood sources; 3) reduced losses from extreme climatic events and improved information for decision making; 4) better capacities for improving freshwater availability for current and future development; promotion of water harvesting, extraction and management technologies that are adapted to decreased rainfall; 5) reduced vulnerability in targeted communities, including through the promotion of alternative sources of livelihoods as a climate risk mitigation strategy.



## Adaptation to the effects of drought and climate change in Agro-ecological Regions I and II

### Country Background and Vulnerabilities

Climate change is set to increase food insecurity in agro-ecological regions I and II in Zambia. The country has a precipitation deficit. Floods are becoming widespread as well: over half of Zambia's districts were severely affected in the last few years. The impacts of these floods include widespread crop failure, outbreaks of human and animal diseases, displacement of human populations and destruction of property and infrastructure. With very little infrastructure for water collection, Zambia is overwhelmingly dependent on rainfall.

### Project Activities and Expected Impacts

The goal of the project is to improve food security through enhanced adaptive capacity to respond to the risks posed by the effects of climate change. The project takes a two-pronged approach: 1) improve the mainstreaming of adaptation into agricultural planning and national, district, and community levels; and 2) test and evaluate for adaptation value interventions that will protect and improve agricultural incomes for the effects of climate change. Capacity and systems to anticipate, assess, and prepare for climate change risks are developed at community, regional, and national levels. The project will determine the barriers that prevent scaling up of such activities. Adaptation learning generated from the pilot projects will be used to guide mainstreaming of adaptation in national, fiscal, regulatory, and development policy, to support adaptive practices on a wider scale.

There are two main expected outcomes for this project: 1) improve capacity to use climate risk information planning processes; and 2) implement priority interventions identified through consultation with communities within the eight pilot sites. Capacity improvement will be achieved through the following: training provided to Zambia Meteorological Department (ZMD) for seasonal and long-term weather forecasts; provision of equipment for the collection and monitoring of water and weather data; based on assessments within the pilot sites, new early warning systems will be developed so that climate risk information is effectively communicated to end users; and an economic impact assessment evaluating benefits of climate risk information will be undertaken to guide further investments in climate risk information services.

The interventions referred to in the second outcome will be closely monitored and their cost-effectiveness will be determined. These interventions include: implementation of soil and water conservation techniques; promotion and introduction of crop diversification practices; promotion and introduction of alternative livelihoods; and water storage and irrigation systems improved or developed to ensure adequate water provision to crops and livestock. The eight pilot sites are situated in the following provinces (two pilot sites per province): Lusaka, Western, Southern, and Eastern Province.

Through the third outcome, the project will use the results of these interventions to encourage adjustments of the strategies and policies that reduce the resilience of rural communities to climate change impacts. The final outcome of this project will ensure that lessons are adequately disseminated.





## Integrating adaptation to climate change into agricultural production and food security in Sierra Leone

### Country Background and Vulnerabilities

Sierra Leone's economy depends heavily on its natural resources. Agriculture is the largest economic sector. 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 climate hazards such as seasonal drought, strong winds, thunderstorms, landslides, heat waves, floods, and changed rainfall patterns. Poor communities have suffered the most from climate change impact, as floods destroy their crops and increased droughts cause water shortages in some areas of the country.

### Project Activities and Expected Impacts

The project seeks 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 in the long term. This objective is mapping and characterization of the vulnerability

of inland swamp rice production, establishing 100 hectares of climate-proofed inland rice fields in inland valley, and 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 and climate-resilient irrigation practices. 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 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 help rural farmers sustain production in periods of low rainfall, but also contribute 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: national professionals and the general public, with particular attention to women and children. Concerning the capacity of national government professionals, training is provided to different categories of personnel such as forecasters, observers, and instrument technicians in the meteorological department. Recognizing that weather and climate information is crucial for agriculture, 16 weather stations are being improved or established to improve the functionality of the monitoring system.



## Strengthening adaptive capacities to address climate change threats on sustainable development strategies for coastal communities

### Country Background and Vulnerabilities

Observations in Haiti tend to confirm these scientific findings: people report dry seasons lasting longer and rainy seasons less, but they are 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 a trend suggesting increased frequencies of hurricanes. The impacts of these climatic changes pose a direct threat to the island's tightly populated coastal settlements and their economies. The densely populated slum districts of Haiti's coastal cities are located to a large degree in flood plains, rendering the poorest even more vulnerable to catastrophic hydro-meteorological events.

### Project Activities and Expected Impacts

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

First, the project fosters a policy shift from reactive crisis management to proactive risk management. 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 programs.

Construction and development standards are also reviewed and upgraded so that key features of climate impacts in Haiti are incorporated into the design of coastal infrastructure and equipment, and adaptation requirements are properly incorporated into the design of the new Environmental Information System for Haiti. Furthermore, it strengthens institutional set-ups and mechanisms to adapt to anticipated climate change impacts, and ensure that information flows are improved among climate monitoring, forecasting, and early-warning services to communities in high-risk coastal areas.

Second, the project helps make the costs of climate change on human development in more explicit in order to mobilize the donor community and stimulate the creation of a National Adaptation Coalition. Investments are to be executed and funded in a coordinated way, from a variety of sources.

Finally, the project implements community-based adaptation measures to demonstrate how to withstand the impacts of extreme weather events. New risks assessments procedures and zoning regulations are tested 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.





## Integrated adaptation programme to combat the effects of climate change on agricultural production and food security

### Country Background and Vulnerabilities

Benin's economy heavily depends on agriculture. Seventy percent of the active population is employed in the agriculture sector. 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 reduced precipitation on the order of 20–30 percent at the national level, which translates into a 40–60 percent reduction in the availability of water resources; and an increase in events of violent and intense rains, potentially leading to increased flooding and erosion of poorly protected soils, with important losses of productive potential. 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.

### Project Activities and Expected Impacts

The project addresses existing barriers to climate risk prevention through a two-pronged strategy that includes the following: a) general systematic, 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 of how agricultural development can be made more resilient to the impacts of climate change.

The first prong of this strategy addresses gaps in building the necessary systemic, institutional, and individual capacity to implement climate risk management at all levels. First, the project supports the integration of adaptation considerations and practices into relevant sectoral policy-making and planning processes. Similarly, communal development plans and local land management plans are screened for climate risks and will be updated in light of the additional risks. Second, the project's support is used to improve the quality and timeliness of the climate information in support of climate adaptation decisions.

The project provides technical assistance to ensure that baseline activities for upgrading the national meteorological services take sufficient account of the new patterns of risks associated with increased climate variability. Project funds are also used to improve information flows among climate monitoring, forecasting, and early warning services to policy makers and farmer communities in high-risk areas. Moreover, the project takes various actions to build the capacities of the technical staff and local farmers in preventing and controlling climate change impacts on agriculture.

The second prong of the strategy involves setting up pilot activities to assist in the transition of Benin's agriculture sector toward climate resilience. These pilot activities include 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, and increased food and seed storage capacities.





## Building the capacity of the agriculture sector to plan for and respond to the additional threats posed by climate change on food production

### Country Background and Vulnerabilities

Climate models predict that by 2050, the Democratic Republic of Congo's (the DRC) average annual temperature is likely to increase by 2.5–3.7 °C, with seasonal droughts occurring more frequently and lasting longer. Decreased rainfall will be felt most severely in the southern part of the country. It is expected, for example, 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 production of basic food staples for rural communities and, by extension, have implications for food security for the entire Congolese population. The consequences of climatic changes and variability, through yield changes, have already been felt in all of the agroecological zones of the DRC.

### Project Activities and Expected Impacts

The project implements interventions at the national and subnational levels 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) to ensure improved reactivity and resilience to climate change-induced

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

At the national and subnational levels, the project responds to current capacity gaps in the management of climate change risks in the agricultural sector. It supports capacity building for farmers and meteorological services at the national, regional, and local levels, with a view to establishing updated vulnerability/risk and impacts maps, seasonal forecasting, and agro-meteorological bulletins for agricultural services. An agro-hydrometeorological 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. Finally, improved knowledge and forecasting of climate changes in progress allows for developing technological packets adapted to new meteorological risks, which are being made available to farmers and technical services in the ministry.

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 agriculture adaptation to be implemented include the following: diffusion of climate-tolerant varieties of maize, cassava, and rice; selected farming techniques and climate-resilient soil, water, and crop management techniques; and updating of crop calendars and technological packets available to farmers to help them cope better with climate variability.



## Increasing resilience to climate change and natural hazards

### Country Background and Vulnerabilities

Vanuatu comprises about 80 islands. Its archipelagic characteristics, together with limited financial and technical capacity, make it extremely vulnerable to a range of natural hazards. Climate change is likely to impact all sectors, especially agriculture, water, coastal and marine resources and infrastructure, and tourism. Agriculture is entirely rainfed and is susceptible to changes in rainfall distribution. Intense and prolonged rainfall could damage seedlings, result in greater run-off and soil erosion, and encourage conditions that promote pests and diseases. Drought combined with higher temperatures could increase thermal stress on plants. Projected increases in sea surface temperatures and increased ocean acidification are likely to put pressures on the marine food chain. Livelihoods associated with these marine food chains will be negatively impacted. The incidence of vector-borne diseases such as malaria and dengue fever, and water-borne diseases such as dysentery and diarrhea, are likely to increase and shift in distribution.

### Project Activities and Expected Impacts

The project is designed to (a) address the main climate and weather related hazards facing Vanuatu, (b) address immediate priorities already identified, (c) support the country's sustainable development priorities, (d) take account of the existing and potential capacity for implementation, and (e) increase the likelihood of achieving results.

The overarching goal of this project, which is cofinanced by the European Commission (EC), is to mainstream climate change adaptation and climate-related disaster risk reduction into core aspects of the Vanuatu economy and resource management systems through the following components.

**Component 1.** Mainstreaming climate change adaptation and disaster risk reduction at national, provincial, and community levels. Activities include the following: incorporating climate change adaptation and disaster risk reduction into policy, planning, fiscal, and budgetary processes at all three levels; increasing awareness and education to foster links between national, provincial and community levels of governance on climate change adaptation and disaster risk reduction; strengthening the integration of climate change adaptation and disaster risk reduction at the institutional level; and improving organizational arrangements.

**Component 2.** Strengthening capacity in data analysis, mapping, and vulnerability assessments. The main activities include strengthening and applying capacity in the capture and analysis of geophysical, hydrological, and climate related data; hazard risk mapping; climate forecasting and dissemination; and vulnerability assessments.

**Component 3.** Implementing climate resilience measures in targeted sectors. The indicative list of actions is consistent with addressing the “ridge to reef” characteristics of small island ecology: linking to the threatened livelihoods of vulnerable communities, scaling up successful practices, and highlighting the importance of the issues to the economy and the likelihood of success.





## Increased resilience and adaptation to adverse impacts of climate change in Guinea's vulnerable coastal zones

### Country Background and Vulnerabilities

In Guinea, climate change is expected to have intense and acute impacts on Low Elevation Coastal Zones (LECZs). Coastal lands play a key role in national food security in terms of agricultural production focused on rice, and over one-third of the country's population is located in coastal lands. If climate change considerations are not taken into account, a number of major investment programs in agriculture and industry currently planned in coastal zones, a significant proportion of which are expected to be in highly vulnerable areas, are likely to be at risk.

### Project Activities and Expected Impacts

The project addresses several NAPA priorities directly relevant to coastal adaptation. Special attention has been paid to Priority 5—protection of cultivation in coastal regions. The outcomes and outputs of the proposed project are also relevant to aspects of the following priority NAPA interventions: Priority 2—developing knowledge and good practices with a focus on ecosystem and natural resource management issues; Priority 3—promotion of adaptation technologies in mangroves; Priority 5—protection of cultivation in coastal regions; and Priority 6—improving information, education and communication on climate risks with a focus on legislation and guidance on the sustainable use of natural resources and environmental education for coastal populations.

A logical and cost-effective strategy is to implement the above priorities in an integrated and programmatic manner. The project's resources are used to integrate climate risk reduction into planning, policies, and programs in coastal areas at the national and subnational level. Local action plans for adaptation are developed on a pilot basis and the national master plan for urban coastal cities is reviewed and amended to take climate change and variability into account. This is complemented by capacity building of key stakeholders in socioeconomic groups such as loggers, fishmongers, fishermen, and local politicians.

The project also contributes to informing pragmatic adaptation responses through demonstrations. In particular, the project promotes adaptation to saline intrusion and increased erosion due to SLR, among other things. Effective coastal management systems, primarily "soft" or small scale in nature, are designed and implemented to reduce coastal inundation, for example, by reestablishing zoning and green habitats in priority regions and developing climate-resilient livelihood practices for communities. Finally, good practices are disseminated for potential replication in other areas.

By following a programmatic approach to adaptation, the project enhances the resilience of coastal-area's long-term development to anticipated impacts. Expected adaptation benefits include strengthening of technical capacities in coastal management, decentralized and accessible information, and building social and organizational capacity to integrate climate risk reduction into long-term planning frameworks.





## Integrating climate change risks into the agriculture and health sectors

### Country Background and Vulnerabilities

Samoa is particularly vulnerable to the adverse effects of climate change. Flooding will result in large bodies of stagnant water, leading to increases in mosquito populations that transmit diseases. Extreme rainfall events will lead to overflow of sewerage systems and the spread of pathogens, and flash flooding associated with extreme rainfall events to serious injuries and loss of life. Coastal and surface flooding will cause widespread damage to infrastructure.

Drought, on the other hand, is probable to affect access to safe drinking water and cause loss of agricultural and livestock productivity. Drought will also undermine incentive for farmers to continue working their land. Strong winds associated with cyclones are predicted to result in widespread damage to crops. Loss of land because of sea level rise will further reduce farming land.

### Project Activities and Expected Impacts

This project seeks to increase the resilience and adaptive capacity of coastal communities in Samoa to the adverse impacts of climate change on agricultural production and public health. The project aims to do the following:

- Introduce a systematic process for capturing, analyzing, processing, and disseminating climate risk information for vulnerable sectors demonstrated in the priority development segments of food production and public health
- 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.
- 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.
- Demonstrate and analyze the benefits of crop diversification and drought- and saline-resilient crops at the community farming level, strengthening farmers' options to deal with climatic uncertainties.
- Analyze the relationship between climate trends and vector-borne, water-borne, food-borne, and heat-related illnesses and design more effective disease prevention programs.
- Enable exchange of experiences between Pacific Small Island Developing States on matters of climate change monitoring and agriculture/health sector adaptation.
- The project also enhances the technical and organizational capabilities of the Samoa Meteorological Division to monitor climate trends and provide climate risk and early warning communications.



## Enhancing adaptive capacity and resilience to climate change in the agriculture sector in Mali

### Country Background and Vulnerabilities

The agriculture sector contributes over 50 percent of the Mali national GDP and provides the primary means of livelihood for more than 70 percent of the population. Current changes in climatic conditions are causing degraded conditions for agricultural production and clearly represent a priority threat to the sector development and food security in Mali. Climate forecasts for Mali indicate rising temperatures and decreased rainfall. Many rural areas of Mali already experience severe droughts, irregular rainfalls, and reduction in agricultural yields. Mali's farming systems and livestock breeding are extremely vulnerable to climate change and variability because of significant reliance on rainfed agriculture.

### Project Activities and Expected Impacts

This project helps Mali make the transition toward climate resilient food security through: (a) enhanced ability of small farmers and pastoralists to cope with increasing climate variability; (b) systematic integration of the risks associated with climate change, including variability into key agriculture development policies, plans and legislation; and (c) strengthened institutional capacity to prepare and respond to looming climate change threats on food production.

Improved national capacities to prevent and manage the impacts of climate change on

agricultural production and food security: The project raises the profile of climate risks management at the level of policy makers, technical staff, and local communities and contributes to building the necessary policy, institutional, and legal frameworks to systematically address looming threats from climate change on food production and security. This is achieved through economic assessment of the impacts of climate change on the agricultural sector and establishment of a national funding strategy for adaptation, revised national agriculture sector budgets for addressing adaptation, full training and equipment of key stakeholders with climate risks management tools, options and practices, a Green Paper, and an awareness-raising campaign aimed at policy makers.

Climate resilience of agricultural production systems and most vulnerable agro-pastoral communities strengthened: Larger or more sophisticated investments in upgraded agro-meteorological assistance systems in partnerships with UNDP/ Bureau for Crisis Prevention and Recovery to better monitor, forecast, and manage food crisis situations. Appropriate agro-pastoral farming systems are established in the most vulnerable agricultural areas, for example, use of drought-tolerant crop and pastoral species, application of climate-resilient soil and water conservation techniques, improved crop, and livestock management schemes. Adequate financial climate risks transfer instruments such as weather insurances, community-based insurance schemes, revolving and compensation funds, employment programs, and climate-resilient alternative livelihoods strategies are developed for communities at highest risks.





## Reducing vulnerability to climate change by establishing early warning and disaster preparedness systems and support for integrated watershed management in flood prone areas

### Country Background and Vulnerabilities

Rwanda is characterized by a mountainous landscape and ecosystems particularly vulnerable to climate change. Its ecology is dynamic and complex, and the lakes and rivers constantly change their size and shape according to rainfall and river flow. Rains can be very heavy, sometimes causing violent floods. Rainfall is particularly important as rainfed agriculture dominates food and cash crop production in Rwanda; many of the poorest and most vulnerable communities depend on rain for their livelihoods.

### Project Activities and Expected Impacts

This project aims at reducing both the vulnerability of the Gishwati ecosystem and the Nile-Congo watersheds, positively affecting food security, health conditions through better nutritional status, and environmental sustainability.

**Climate risk assessment and forecasting:** The project increases coordination, collection, and analysis of data. Focus is on strengthening the current information infrastructure for sound scientific analysis of trends in climate change and its socioeconomic impacts, and thus increasing the capacity of communities and institutions to adapt. Benefits are derived from a range of innovative climate-based analytical tools and software.

**Climate change adaptation planning and response strategies:** Focus is in correcting the underdeveloped response mechanism of the Rwandese early warning system. Improved information is provided in appropriate formats to policy makers and communities. Activities aim at promoting the use of robust science for the formulation of adaptation strategies in the present and future. An early warning and response approach is used to increase capacity to identify, predict and, most importantly, respond promptly to long-term droughts and floods and also to sudden and damaging climate events.

**Demonstrations of adaptation practices in the Nile-Congo crest watersheds and Gishwati ecosystem:** Restoration of the ecosystem on which the communities' economic activities heavily depend through short-term measures to address immediate risks, including the reversal of maladaptive practices and the application of selected agricultural techniques that contribute to improved integrated catchment management practices aimed at restoring the natural buffering capacity. Medium- to long-term measures aim to build both human resources and institutional adaptive capacities for the sustainability of the project impacts.

**Knowledge management, public awareness and dissemination of lessons learned and best practices:** Local and national knowledge on adaptation is developed and this component is designed to ensure that adaptation efforts demonstrated through this project can be sustained and replicated through greater public and private engagement, involvement, and knowledge on good practices. Lessons are shared through the Adaptation Learning Mechanism (ALM) web platform.





## Integration of climate change risks into the Maldives safer island development programme

### Country Background and Vulnerabilities

Maldives is one of the countries most vulnerable to the predicted impacts of climate change, especially sea-level rise. The country consists of small, low-lying coral reef islands, which are vulnerable to both short-term changes in sea level, for example, flooding produced by storms and swell waves. There have been recent incidences of swells and storms affecting more than half the populated islands, resulting in loss of property and adverse impacts on water resources and agriculture.

### Project Activities and Expected Impacts

The proposed project aims at reducing the vulnerability of the population to climate change and climate-related natural disasters through reevaluation and improvement of the national Safer Island Strategy, which refers to a range of larger islands, which should provide safe havens for people forced to migrate before or after extreme natural disasters. "Safe Islands" provide communities ecologically safe zones and structures to mitigate the impacts of climate change and preventing losses during emergencies and disasters. Elevated areas and buildings enable also vertical evacuation, and all basic services are intended to be provided during emergencies.

**Capacity Development:** The project enables establishment of a climate information system that ensures the systematic collection, analysis, and dissemination of climate risk information for practical tasks related to Safer Island Development

**Programme planning.** Technical and planning staff at the atoll and island level is trained in climate risk analysis, hazard mitigation, and adaptive planning.

**Policy Support:** Project resources are used to assess, prioritize, and demonstrate anticipatory, adaptive, and innovative measures in coastal development, coastal protection, and resilient land-use planning, zoning, and farming on islands, which are designated to become Safer Islands. Additional technical and engineering studies are undertaken to ensure long-term resilience of communities living on, or moving to, Safer Islands. This strengthens understanding of hazard and vulnerability dynamics on all Safer Islands, and develops guidelines for resilient land-use planning, natural hazard mitigation, coastal development, and land reclamation.

**Climate Risk Reduction:** Priority mitigation and adaptation measures on Safer Islands are defined and integrated into composite risk reduction action plans. They integrate a suite of innovative coastal protection, land use planning, and land reclamation measures based on technical and engineering analysis delivered by the project. The design of individual demonstration measures is aligned with local conditions at the pilot sites and guided by the selection principle of low-cost replication potential.

**Knowledge Management and Learning:** The lessons generated through this project are highly relevant to other small island developing states (SIDS). Targeted knowledge sharing activities within Maldives and beyond ensure dissemination of lessons learned through the global Adaptation Learning Mechanism (ALM) platform. The project assists in developing a critical mass of coastal zone adaptation experience in small island development states.



## Enhancing resilience of vulnerable coastal areas to climate change risks

### Country Background and Vulnerabilities

Liberia is a country of huge resource potential, richly varied geography, and tremendous human capability. Climatic risks pose a serious challenge to its emerging development priorities, with the potential to undermine development prospects and attainment of the Millennium Development Goals (MDGs). The NAPA identified vulnerability of coastal zones to climate change as a priority area for intervention through the Least Developed Countries Fund. Most of Liberia's population live in close proximity to the coast and will experience serious consequences from sea-level rise. Besides the additional pressures resulting from climate changes, the major root-causes for the growing vulnerability of coastal areas include the following: (a) uncontrolled and unplanned urbanization along the coast, aggravated by domestic migrations resulting from the civil war; (b) unsustainable agricultural practices leading to clearing of mangroves and degradation of coastal vegetation systems; (c) sand mining; and (d) oil pollution and illegal solid and sewage wastes dumps.

### Project Activities and Expected Impacts

To tackle this challenge, the required solution in Liberia is to promote a national adaptation process that generates a paradigm shift and support a climate-resilient costal management regime. This new adaptive system is characterized by the following: adapted systemic and institutional frameworks governing costal development and Integrated Coastal Zone Management (ICZM); adoption of costal management practices more consistent with the threats from SLR; increased

information flows on climate change, including variability, between producers and users; strengthened abilities to design and implement early adaptation actions and long-term resilience plans; and well-managed and disseminated adaptation knowledge to stimulate a sectorwide change toward resilience.

The proposed project covers a significant part of the additional costs associated with enhancing Liberia's resilience and reducing vulnerability to climate change impacts in coastal regions, as well as incorporating climate change risks into national development programs. Contributions toward the reduction of vulnerabilities to climate change are achieved through the pursuit of specific outcomes, including the following: (a) integrating concerns into policies and planning processes at the state and national levels, (b) implementing risk reduction strategies and measures at pilot sites, (c) strengthening technical capacity to integrate climate risks into management of coastal regions, and (d) capturing and disseminating lessons learned to key stakeholders. Expected adaptation benefits include strengthening of technical capacities in key sectors, development of social and organizational capacity, and general awareness about the adverse impact of climate change. The project also promotes a programmatic approach to adaptation planning among various stakeholders, development partners, and donors, and facilitates the mainstreaming of climate risk reduction into planning frameworks, policies, and programs in Liberia, with an emphasis on such measures in vulnerable coastal areas. In the face of climate change and Liberia's subsequent adaptation to its adverse impacts, the project also supports future scaling up and replication, as well as identifies possible investment opportunities for adaptation. Finally, the project is catalytic in fostering a broader programmatic adaptation framework in Liberia.





## Promoting climate-resilient water management and agricultural practices

### Country Background and Vulnerabilities

The impacts of climate change on Cambodian agriculture, particularly on rice cultivation, are predicted to adversely affect food production and security in rural areas. At present, there is emerging evidence that agriculture-based livelihoods and overall food security in Cambodia are affected by increased frequency and severity of floods, dry spells and drought events. Various climate models depict different trends in annual precipitation, with some predicting substantial increases in total precipitation and some predicting a rise, followed by a fall.

### Project Activities and Expected Impacts

This project increases the adaptive capacity of key stakeholders in water resource management to address the impacts of climate change. The project focuses in particular on the water resource needs of the agriculture sector. The project identifies, prioritizes, and drives the 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.

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 sector in Cambodia. The project assists in the development of capacity in the area of development planning and

selection of local adaptation options appropriate to address the climate change risks in the water resources sector.

Capacity within local institutions to manage agricultural water resources in a changing climate is increased through Commune Council Plans and budgets addressing inherent climate risks in target districts, training engineers in climate-resilient irrigation design, demonstrating conflict resolution institutionalizing in areas prone to climate-induced water shortages, and establishing a community-based climate information system on floods and drought events.

Locally appropriate adaptation options are demonstrated to reduce exposure to climate-induced risks through improving rainwater harvesting facilities in 20 target villages, demonstrating resilient farming methods to climate-induced changes in rainfall intensity and distribution, as well as resilient design and management of reservoirs, irrigation canals, ponds and dykes.

Lessons learned in project pilot sites will be replicated in other vulnerable areas of Cambodia. To support this, the project designs and implements public awareness and environmental education programs on climate risk reduction, establishes learning networks for climate-resilient farming practices, extends the Service Centre for Farmer Water-use Committees (FWUC) with climate change learning capability, disseminates project lessons through television and radio, and generates modifications to national policies on climate change adaptation as lessons are derived from the project activities.





## Improvement of early warning system to reduce impacts of climate change and capacity building to integrate climate change into development plans

### Country Background and Vulnerabilities

Lesotho is one of the chronically poverty-stricken landlocked LDCs. It is prone to natural disasters, drought, and desertification, has a fragile mountainous ecosystem, and is particularly vulnerable to the impacts of climate change. Lesotho predicts warmer future climatic conditions and changing precipitation patterns in such a way that good seasonal rains that characterize the summer season could shift to late autumn. Meanwhile, the country is already paying the high costs of global warming. Such natural phenomena as tornadoes, droughts, strong winds, hail storms, and heavy snowfall leave large numbers of people vulnerable to life-threatening situations and wreak havoc with food security.

### Project Activities and Expected Impacts

The project seeks to integrate climate change issues into national policy development debates and legislative frameworks by building capacity at both institutional and systemic levels.

**Climate change monitoring and prediction:** The project aims to improve the existing meteorological observation network and develop a sound climate-observing system for monitoring climate change. This is achieved through upgrading existing observation equipment and installing new equipment.

The project also improves infrastructure and technical capacity for climate prediction, including impact studies at the national level. This is realized through upgrading the operational forecasting office to better simulate the local climate and evolution of extreme events. Monitoring climate change requires mechanisms for monitoring socio-economic and environmental vulnerabilities, particularly the impacts on livelihoods. A socio-economic database linked to the climate database is established to provide interlinkages between climate and various sectors.

**Climate change risk communication systems:** An effective early warning communications strategy is developed to encourage the population to actively respond to climatic changes. Appropriate and effective communication channels are developed. **Climate change policy:** Existing national initiatives to develop climate change policy frameworks and institutional mechanisms focusing on integration of climate change into national development plans are strengthened. These frameworks ensure increasing levels of climate change integration, awareness, and education.

**Training:** The project develops and implements a training program aimed at capacitating technical and operational staff for climate change early warning. This includes building capacity within the national early warning unit, focusing on preparedness, and management of climate induced disasters. **Public awareness and education:** The project seeks to enhance existing public awareness and education strategies and materials in affected communities.



## Support to the adaptation of vulnerable agricultural production systems

### Country Background and Vulnerabilities

The West African climate, particularly in the Sahel, has undergone recurrent variations of significant magnitude since the early 1970s. The whole region, including Mauritania, has experienced a marked decline in rainfall since around 1968–72. Mauritania has experienced chronic drought over the course of the last 30 years, which has had negative impacts on the rural communities that have been subjected to increased water stress. Their response has been to further exploit both surface and groundwater resources with little planning. A major environmental vulnerability related to climate change is the drop of water tables, which results both from current usage practices and 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.

### Project Activities and Expected Impacts

This project's aims are twofold. It seeks to conserve water supply by creating catchment devices to promote the infiltration of runoff to replenish groundwater in the oasian zones. At the same time, the project aims to improve management of water demands by improving the hydro-climatic information needed to ensure sustainable use of a diminishing resource.

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 wellbeing. The project addresses urgent issues through improved environmental management and shows 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 enhances the capacity of the population for improved local water management through improved awareness and implementation of water management strategies and techniques appropriate to a changing climate. The project also aims at ensuring that the correct information and policy management systems are put in place to improve medium- and long-term planning to sustain water resources in an increasingly arid climate.

IFAD, its United Nations partners and the Government of Mauritania are seeking complementarities with other development partners, for example, through the joint donor intervention matrix for 2006–2010 in response to the second Mauritanian poverty reduction strategy paper and related action plan. IFAD is leading the Terrafrica process in Mauritania through the preparation and implementation of a country strategic investment framework for Sustainable Land Management (SLM). An ad-hoc SLM committee was established by law and is coordinating all SLM investment in the country, including activities that aim at mitigation and adaptation to climate change. Therefore, coordination with the IFAD/GEF supported project Participatory Environmental Protection and Poverty Reduction in the Oasis of Mauritania is ensured.





## Implementing NAPA priority interventions to build resilience and adaptive capacity of the agriculture sector to climate change

### Country Background and Vulnerabilities

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 and following evapotranspiration and decrease in rainfall will further increase climate vulnerability in a society that is already heavily dependent on rainfed agriculture and pastoralism for survival. The adaptive capacity of the Nigerien farmers and pastoralists to deal with such challenges is at best marginal. 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 are being tested for increasing crop productivity and thereby increasing resilience to climate change. The “Zai” methodology, for example, entails digging holes of 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. Crops such as millet, sorghum and maize are sown in the “Zai” holes and their productivity is greatly increased relative to plants sown outside of the 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 must be bought, and poor rural farmers cannot afford this cost. The project can be instrumental in establishing mechanisms for the diffusion of drought-adapted crop varieties to vulnerable communities. The facilitation of food banks is another activity 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. A final measure implemented to counter the threat of climate change induced impacts on crop productivity is to improve water management practices.

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 concerning 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.



## Integrating climate resilience into agricultural production for food security in rural areas

### Country Background and Targeted Vulnerabilities

Landlocked in West Africa, Mali is ranked among the poorest countries in the world. With 83.4 percent of the population working in the primary sector, Mali heavily depends on agriculture or other land-based activities and vulnerability to changing climatic patterns is very high. About three fourths of the 13.5 million inhabitants live in rural areas in conditions of extreme poverty. This rural population is facing strong mobility pressures connected to the rural exodus. Mali's agricultural sector is highly dependent on climatic factors; climate change will have great impacts on this sector.

### Project Activities and Expected Impacts

The project seeks to enhance the capacity of Mali's agricultural sector to cope successfully with climate change, by incorporating climate change adaptation concerns and strategies into ongoing agricultural development initiatives and mainstreaming these concerns into agricultural policies and programming. This will be achieved through a two-pronged approach: a) strengthening farmers capacities on one hand through an expanding network of Farmers Fields Schools (FFS) initiatives already supported by Malian government and FAO; and b) mainstreaming climate change considerations into agricultural sector planning and increasing cross-sector coordination. Project interventions will take place in at least three vulnerable regions and in three production systems (dry cereals, cotton/rice, and "maraichage").

The project will generate adaptation benefits by ensuring that farmers and pastoralists are involved in the consultative process at community, district, and national levels.

Adaptation benefits include the following: a) adoption of resilient varieties and cultivars and sound climate change adaptation practices results in surfaces and yields of dry crop cereals and other selected crops at least maintained in each one of the three ecosystems; b) at least four mayor partner projects and/or governmental programs actively involved in piloting improved soil and crop management practices in three different ecosystems identified in the NAPA and at least three production systems (dry cereals, cotton/rice, "maraichage"); c) 30 percent of the crop areas assisted by potential partner programs incorporate improved climate change adaptation strategies, practices and genetic material, leading more resilient production systems; d) 800 Farmer Field Schools fully integrate climate change adaptation strategies and practices in support to farmers' adaptation processes; e) at least 100 Farmers Fields Schools-based climate change adaptation initiatives supported by the Climate Change Adaptation Fund, mobilizing complementary financing of at least \$200,000 by year 4; f) 16,000 farmers adopt improved climate resilient practices through FFS training; g) climate change considerations mainstreamed into 50 percent of agricultural sector policies, programs and planning (30 percent of operational projects in sector-level programs incorporate budgets for climate change adaptation components) based on "lessons learned"; h) mechanisms established for cross-sector coordination and awareness-raising on climate-resilient production and food security; i) increased institutional capacity at national level to develop climate change adaptation policies, strategies, and programs, shifting from a reactive response to a proactive preparedness approach.





## Integrated coastal zone management in Yemen

### Country Background and Vulnerabilities

The coastal zone of Yemen holds a rich variety of natural habitats and species, and is a natural hub for development in terms of fisheries, coastal settlements, coastal infrastructure, tourism, and new development initiatives. If properly managed, these coastal and marine resources could become a major source of employment and income for Yemen's rural poor. The vast majority of Yemen's poor live in rural areas. This segment of the population, particularly poor coastal communities, is most threatened by climate change variability. Predicted sea level rise will increase coastal flooding and erosion, increase saltwater intrusion into surface and groundwater systems, raise the cost of coastal protection, and lead to the loss of wetlands and other coastal ecosystems. Other projected climate changes for Yemen include increased temperature, reduced annual rainfall, and increased frequency of high-intensity rainfall and storm surges.

### Project Activities and Expected Impacts

It is critical that development in Yemen occur within a broader sustainable development policy framework and harmonize with climate considerations to make it climate resilient. The project focuses on coastal zone management. By addressing urgent on-the-ground activities, the project seeks to reduce the vulnerability of Yemen's coastal and marine resources to climate change. Two pilot sites representing the major coastlines in Yemen, one along the Gulf of Aden and the other

along the Red Sea, explore ways to increase resilience to climate change impacts through implementation of an Integrated Coastal Zone Management (ICZM) approach. The project is made up of three interrelated components:

Component 1. Institutionalization of an ICMZ approach and climate change adaptation in selected governorates. A climate change gap analysis for ICZM is completed, and policy and institutional frameworks are strengthened through improved intersectoral coordination among national and local agencies for the management of coastal zones appropriate for climate-resilient development.

Component 2. Knowledge management through data collection and analysis through downscaled climate modeling to inform climate-resilient development. The project aims to facilitate informed policy and decision making through the provision of value-added information and databases, including downscaled predictive regional and global climate change models.

Component 3. Piloting climate change adaptation into ICZM at two pilot sites: At the two pilot sites, Bir Ali-Burum, along the Gulf of Aden and Kamaran-Luhaiyah, along the Red Sea, the project explores different types of optimum practices within the framework of ICZM.

Collectively, these two pilots showcase the value of climate resilient-based ICZM along these vulnerable coastlines and serve as models for good practices and lessons learned to other parts of Yemen.



## Adapting water resource management in Comoros to increase capacity to cope with climate change

### Country Background and Vulnerabilities

Comoros comprises three islands in the Indian Ocean: Grand Comoros, Anjouan, and Moheli. About 75 percent of the population engages in subsistence farming. It is already facing the effects of climate change. Its NAPA reports a rise in annual temperatures of about 1 degree C over the past 30 years and a shortening of the rainy season from six months to two to three months. At the same time, the mining of sand, gravel, and coral is leading to extensive coastal erosion. In the past 20 years, 90 percent of the beaches have disappeared on Grand Comoros, increasing the island's vulnerability to sea-level rise.

### Project Activities and Expected Impacts

The project seeks to reduce the risk of climate change on lives and livelihoods from impacts on water resources. It addresses the country's vulnerability to climate change by focusing on the project site and capacity building. Institutionalizing the ability to monitor climate change assures greater sustainability. The project includes the following three components.

Component 1. Support institutional development to integrate climate change into water resource management. Such capacity development as knowledge development, training, and equipment is needed for such stakeholders as the institutions in charge of water management, community structures involved with water resource management, and the national water supply company. In the project

planning phase, a rapid needs assessment is conducted in order to develop a capacity development plan based on priority needs. A coordinated cross-government policy process is strengthened to consider changes needed to water management policy and regulatory and fiscal instruments to manage the effects of climate change. Project results are analyzed through this coordinated policy process for their implications on national water and adaptation policies.

Component 2. Demonstration of pilot water interventions that can mitigate climate change risk, targeted to vulnerable communities. This component focuses on technologies to improve water access and quality that simultaneously mitigate climate change, such as soil conservation measures, water harvesting, and remedial work on existing boreholes.

Component 3. Development of knowledge products to communicate results to policy makers and the international community: Knowledge products are developed on lessons learned for policy makers, communities and donors, and a national knowledge platform is developed to facilitate learning from project implementation.

The most significant barriers to ensuring climate change-sensitive water management policy and investments are the scarcity of baseline data, the inability of the general populations and the government to pay for water provision, underdeveloped regulations and policy instruments at the national and island level, and low levels of human capacity to implement these policies. The project addresses these constraints by working in a complementary manner to baseline investments made by the UNDP and the GEF in the area of water resource management.





## Strengthening resilience and adaptive capacity to climate change in Guinea-Bissau's Agrarian and water sectors

### Country Background and Vulnerabilities

The NAPA report highlights that gradual increases in temperature, and thereby, evapotranspiration, and reductions in rainfall will significantly reduce the productivity of the agrarian sector and exacerbate water scarcity in Guinea-Bissau. Farming engages over 90 percent of national households and contributes 62 percent of GDP. The economy, therefore, largely depends on farming, which in turn relies heavily on rainfall intensity and regularity, in spite of the largely underexploited potential for irrigation.

Although updated data on water resource use and water availability are non-existent, the NAPA indicates that decreased rainfall will have a significant impact on both. It could render the planting of certain crops unviable in the drier regions, where farmers will have to increasingly resort to livestock for their livelihood, which would in turn require different skills, technology, and higher upfront investment for already impoverished households. Under these conditions, the "coping range" of rural populations will be significantly impacted by climatic change, given that large parts of the population and the economy are involved in, and dependent on, the sectors that are highly susceptible to climate risk.

### Project Activities and Expected Impacts

The project builds directly on Guinea-Bissau's two top NAPA priorities in the agricultural and water sectors and is structured around two parallel capacity building strategies. One side of this strategy focuses on general training and capacity building, including activities such as the training of key national stakeholders on climate change and adaptation planning, facilitating a process to mainstream adaptation into key development plans and sectoral policies, and improving the quality and dissemination of climate data as a foundation for decision making locally and nationally.

The other side of the strategy focuses on the practical demonstration of relevant local adaptation measures in the food and water sector—primarily through pilot activities in individual villages. These pilots aim to demonstrate a wide selection of potential adaptation options: techniques for efficient water use in crop production systems and rural water supply; climate resilient food production methods; for example, improved grain storage, crop diversification, use of short-cycle seeds and varieties that are less demanding of water or resistant to prolonged droughts; climate-resilient small ruminant breeding; and climate-resilient water resource management schemes, such as micro-reservoirs, small dykes, and dissemination of low-cost irrigation systems. If successful, these two parallel strategies provide Guinea-Bissau with a solid institutional and human capacity for scaling up adaptation planning and practical on-the-ground experiences that can be replicated outside of the pilot regions.

The project closely interacts with the following projects and programs currently under implementation in Guinea-Bissau



## Strengthening the adaptive capacity of most vulnerable São Tomean's livestock-keeping households

### Country Background and Vulnerabilities

Studies conducted as part of the NAPA preparation documented that São Tomé and Príncipe has experienced the following climate-related phenomena during the last few decades: (a) temperature increases; (b) decrease in rainfall and subsequent decrease in riverflow and water supply; (c) deaths of artisanal fishermen and loss of fishing equipment because of increased fog, strong winds, and increased turbulence at sea disrupting traditional navigation and safety-at-sea practices; (d) destruction of fishing vessels along harbors and beaches because of increased storms; (e) increase in women's poverty because of loss of their husbands' lives and fishing equipment; (f) longer dry seasons leading to drought conditions, which, followed by torrential rains, lead to landslides, flooding, and groundwater contamination; (g) increasing coastal erosion leading to loss of houses and infrastructure, and isolation of local communities; and (h) decreased tourism. Climate change is likely to aggravate such long-term trends, putting additional pressure on already vulnerable Santomean coastal communities.

### Project Activities and Expected Impacts

The project tackles challenges related to the impacts of climate change on Santomean coastal development in two main areas: 1) Coastal erosion and loss of coastal property caused by sea level rise combined with the effects of increasing precipitation

intensity; and 2) Increased loss of life and canoes caused by extreme weather events, such as storms, fog, and changes in wind patterns.

The project is structured around both direct physical interventions and capacity building. Among the more "direct" activities are the following: the project constructs shelters to function as refuges for boats during storms and thus limits the economic impact and livelihood losses associated with such events and provides sea safety equipment, such as simple radar reflectors and life vests to artisanal fishermen, consequently reducing the amount of lives lost at sea due to climate change-induced extreme events, such as fog, turbulence and strong winds. Such concrete physical interventions are in turn supported, and reinforced, by broader capacity building measures, such as training fishermen in sea safety under changed climatic conditions and establishing an early warning system disseminating timely forecasts to coastal communities prior to extreme events.

The project closely interacts with the following programs currently under implementation in São Tomé and Príncipe: (a) a national support program for development of the fisheries sector; (b) a program funded by the Spanish Agency for International Cooperation for Development (AECID) supporting the national support program focusing on capacity building and market creation in the fisheries sector; (c) a partnership with the Portuguese Institute for Environment aimed at improving modeling of the weather and sea conditions in São Tomé and Príncipe; (d) Portuguese funding for Civil Protection Services; and (e) European Union (EU) funding for coastal protection and protection of coastal infrastructure.





## Improving the resilience of the agricultural sector in Lao PDR to climate change impacts

### Country Background and Vulnerabilities

The two primary climate change-related hazards expected in Lao PDR are floods and droughts, along with their adverse impacts on food security and agricultural production. Climate change is expected to have a range of impacts, including the following: increases in annual mean surface temperatures of around 0.1–0.3 degrees Celsius per decade; a longer annual dry season; more intensive rainfall events; and more frequent and severe drought and flooding events. The 4<sup>th</sup> IPCC report indicates that the Mekong basin is expected to experience increasing maximum monthly flows of +35–41 percent and decreasing minimum monthly flows of 17–24 percent over the course of this century, which will substantially increase flooding risks in the wet season and water scarcity in the dry season.

### Project Components and Vulnerabilities

The project aims to reduce national and local food insecurity resulting from climate change by reducing farmer vulnerability to extreme floods and drought events. First, the project compiles all existing climate hazard and vulnerability information from a multitude of previously dispersed sources, and makes it available for detailed local analysis and application in the agricultural sector. Second, the capacities of key stakeholders responsible for planning and management in the agricultural sector are increased through targeted training, and key policies and plans are reviewed to take into account the impacts of climate change in the agricultural

sector. Third, demonstration activities are undertaken in selected pilot communities particularly vulnerable to one or both of the main agricultural climate change vulnerabilities: the risk of increasing frequency and severity of droughts, and more intense flooding episodes. These pilots aim to provide the insights necessary for addressing climate change-induced drought and flooding risks in an integrated manner, and eventually enable scaling up of successful strategies at the national level.

The project closely interacts with the following programs currently under implementation in Lao PDR: (a) flood management and mitigation programs being implemented by the Mekong River Commission; (b) Asian Development Bank (ADB) support for community-managed irrigation systems and flood and drought management; (c) UNDP/ United Nations Environment Programme (UNEP) Poverty Environment Initiative (PEI), which aims to build the long-term capacity of the Lao government to integrate environmental concerns into national development plans, investment management processes, and poverty reduction strategies; (d) World Wildlife Fund (WWF) and International Union for the Conservation of Nature (IUCN) activities related to climate change impact research; (e) the Northern Uplands Programme, which is currently being designed by the French Agency for Development (AFD), the European Commission (EC), the Swiss Agency for Development and Cooperation (SDC), and the German Agency for Technical Cooperation (GTZ); and (f) ADB and International Fund for Agricultural Development (IFAD) project Sustainable Natural Resource Management and Agricultural Productivity in southern Lao PDR.



## Increasing resilience to climate variability and hazards

### Country Background and Vulnerabilities

The Republic of Kiribati (population 112,000) comprises one oceanic island (Banaba) and 32 low-lying coral atolls. Kiribati is particularly vulnerable to climate variability and weather extremes with its atolls rising only 2 meters above mean sea level. In 1999, two uninhabited islands of Kiribati were lost under water. Climate related threats include increased temperatures, more frequent droughts and storms events, rising sea levels, and more frequent seawater flooding events. The adverse impacts of climate change are already taking place in Kiribati and affect the health and livelihood of the majority of the population and pose increasing burdens to the economic wellbeing of Kiribati.

### Project Activities and Expected Impacts

The project's goal is to improve the resilience of Kiribati to the impacts of climate change on freshwater supply and coastal infrastructure. This objective will be achieved by strengthening the government capacity and improving the management and governance of water resources and infrastructure. The project is composed of three interlinked components, as follows:

**Component 1** will produce measurable adaptation benefits to address these water supply issues. Activities involved include the following: expanding the installation of groundwater abstraction systems to two further sites on North Tarawa; improving water reticulation management (leakage detection and repair of real losses); expanding the program of installing rainwater harvesting systems on public buildings for community use; and improving the legislative and regulatory framework and governance model for water resources management. Adaptation benefits include the

following: increasing the total volume of potable water available per day; increasing and diversifying the sources of potable water; and reducing the impact of drought and storm surges on quality and availability of freshwater resources.

**Component 2** will produce measurable adaptation benefits to reduce the vulnerability of coastal communities to sea-level rise and extreme weather. Activities involved include the following: investing in further shoreline protection of public assets; further building Ministry of Public Works and Utilities' capability to mitigate shoreline erosion—coastal assessment, options analysis, design, and construction; developing the government's skills in coastal infrastructure asset management through mentoring and additional training; and expanding the mangrove planting program in outer islands. Expected adaptation benefits include an increase in the length (kilometers) of coastline where public and private assets have been made resilient to the effects of sea -level rise, storm surge, and extreme and variable weather events.

**Component 3** of the proposed project will support the strengthening and capacity building of the institutions responsible for climate change adaptation and disaster risk reduction: providing additional technical support to institutions on climate change adaptation and disaster risk reduction coordination, integration and policy harmonization functions; preparing a national coastal management policy framework and strategy aimed at better management of coastal zones, resources, and infrastructure and facilitate local communities and Island Councils, with help from government ministries to develop locally managed adaptation plans; and covering the direct costs of communications and media activities relating to climate change adaptation and disaster risk reduction over the duration of the project.





## Developing core capacity to address adaptation to climate change in productive coastal zones

### Country Background and Vulnerabilities

Tanzania is one of the poorest countries in the world. About 85 per cent of the country's poor people live in rural areas and rely on agriculture (including livestock) as their main source of livelihood. Tanzania is vulnerable to climate variability and extremes as a result of prevailing vulnerability of its people and institutions and because of existing climate variability. There is a strong link between climate and Tanzanian livelihoods as it depends heavily on rainfed agriculture making rural livelihoods and food security highly vulnerable to climate variability such as shifts in growing season conditions. Predicted impacts of climate change include sea level rise, temperature and rainfall changes, leaching of nutrients in coastal areas' soils, potential destruction of breeding grounds and mangroves for fisheries, and negative effects on major river basins.

### Project Activities and Expected Impacts

The project addresses impacts of climate change on the coastal zone, with a particular focus on sea-level rise and water availability impacts. The project seeks to address the gaps in the adaptive capacity of local communities and administrations, who suffer from limited technologies, human capacity, and financial resources. The project is delineated in three components:

**Component 1:** Scientific and Technical knowledge and capacities for climate change adaptation

analysis: This component will produce integrated and rigorous district-level vulnerability assessments and to introduce key tools for resilient planning. District and central level training on sectoral vulnerability and planning for resilience under an ICZM framework will be delivered.

**Component 2:** Broadening Stakeholder Engagement for Vulnerability Reduction. This consists of activities designed to build a stakeholder base among civil society, specifically NGOs and the academic sector, which constitute two key partners in promoting resilience in the country. Whereas the previous component's scope was at the district level, this component has a larger aim of seeking support of the emergence of new groups of stakeholders in adaptation planning and programming. The capacities created, are expected to bring benefits at national level, but a focus on coastal zone vulnerability will be maintained during the duration of the project.

**Component 3:** Priority adaptation interventions for resilient Integrated Coastal Zone Management. This component comprises activities designed to address urgent and immediate coastal adaptation needs as identified in the NAPA. The immediate objective of this component is to restore natural and manmade coastal protection systems so that they can provide services even in a climate change scenario. The project will support the rehabilitation of mangroves as a key buffering and productive ecosystem in coastal areas, as well as the upgrade and rehabilitation of existing coastal protection infrastructure such as sea walls, dikes, and spillways. The project will also address the urgent problem of water supply in areas where boreholes and wells have already been inundated or salinized because of sea-level rise and changes in coastal processes.



## Integration of Climate Change Risk and Resilience into Forestry Management (ICCRIFS)

### Country Background and Vulnerabilities

Samoa is particularly vulnerable to the adverse effects of climate change. A recent climate risk profile for Samoa identified a plenty of possible impacts of changing climate in Samoa. Specific impacts on forestry resources include the recorded extensive cyclonic damage to Samoa's forest resources, and the ineffective recovery actions taken to date, further compounded by the increasing risks of drought and forest fires. These impacts increase soil erosion, further threatening Samoa's unique biodiversity, and reduce the effectiveness of existing watershed management and traditional harvesting. More intensive extreme climatic events are projected in Samoa, with further damaged forest canopies exacerbated by the current lack of climate change risk integration within the forest subsectors.

### Project Activities and Expected Impacts

The project is expected to support the the integration of climate risk and resilience into relevant agroforestry and forestry policies and practices, including environmental and meteorological data to better respond to current and anticipated climate change impacts in Samoan rural communities that depend on forestry resources for their livelihoods. The policy and management guidelines and recommendations to be developed will provide a knowledge basis for the application of enhanced forestry techniques under a range of anticipated climate change scenarios.

The project will facilitate the testing and implementation of these guidelines in selected demonstration areas and pilot communities, combining scientific techniques (such as climate change projections, GIS mapping, and remote sensing) with grassroots participation and community-based appraisal of climatic hazards. Based on these capabilities, the target communities will develop communal risk reduction plans as part of their overall forest management plans. Small-scale adaptation measures will, therefore, be prioritized to effectively reduce the risk of rapid and slow onset climate-induced impacts. The participatory vision of this exercise will ensure that all pilot communities acknowledge the existing and anticipated climate change risks and address them in a timely and well-informed manner. The project will support a cross-section of livelihoods in different forest ecosystems, with such expected livelihood benefits as improved food security, sustainable use of timber and other forest products, and reduced exposure to disasters.

The project seeks to enhance institutional capacities of relevant line ministries and their specialized departments, including their district and local level representatives and field staff. Institutional capacities will be strengthened to integrate climate resilience into sectoral policies and operational plans, as well as to deliver technical tasks related to forestry management and monitoring. The policy changes will aim at supporting an enabling environment for the implementation of on-the-ground demonstration measures, therefore strengthening institutional structures to address climate risk in the longer term.





## Promoting autonomous adaptation at the community level in Ethiopia

### Country background and vulnerability

Climate change is already affecting the security of Ethiopia's sustainable development because the livelihoods of the majority of the population are sensitive to climate-related shocks, including drought and flooding. This is due, in part, to the reliance of the economy on rainfed agricultural production. Climate change threatens to exacerbate the impacts of the overuse or misuse of the country's environmental resources (including arable land, water, pasture, forest, and biodiversity), with concomitant impacts on Ethiopia's environmental, food, water, and energy securities.

The Ethiopian government has acknowledged the climate change risk the country faces and has stated it as a priority development issue for the country.

### Project Activities and Expected Impacts

This project supports local communities and administrations at the lowest level of government to design and implement adaptation actions aimed at reducing vulnerability and building resilience, especially in those communities that are particularly vulnerable. The project aims to be a catalyst for promoting national action that builds the resilience of local communities and their capacity to innovate and manage climate change opportunities and risks. This will be achieved through demonstrating the positive impact of bringing together climate change adaptation techniques and technologies through an area-based integrated planning and implementation process on local communities. The project will

enhance the capacity of national agencies to use this information in a way that improves effective role of early-warning information.

The intervention will be delivered through four interrelated components as described below:

**Component 1:** Regional and local institutional capacities. The main outcome of this component is to strengthen subnational institutional capacities for coordinated climate-resilient planning and investment. Capacities for supporting climate risk management at subnational level, including access to relevant planning information, need to be strengthened or built where necessary. Capacity for integrating local sector intervention plans into multisector climate planning at subnational level will be built through the training of selected regional planners, local development agents, and community councils in approaches and methodological tools for planning processes.

**Component 2:** Access to appropriate technologies. Activities undertaken under this component are the following: in-situ soil moisture storage to improve rainfed crop productivity; runoff or wash-out water storage for high value crop gardening; construction of hand-dug wells for domestic water supply as well as for production; legume intercropping and continuous cover cropping for soil conservation; and minimum tillage techniques and water harvesting.

**Component 3:** Climate risk reduction. The project will develop capacity in the National Meteorological Service Agency to facilitate downscaling of seasonal weather forecasts and packaging and dissemination of information in a way appropriate for regional and local planners.



## Enhancing resilience to climate change by mainstreaming adaption concerns into agricultural sector development in Liberia

Liberia is in a period of transition after years of conflict and humanitarian emergencies. It is now moving through recovery and to development. Despite substantial recovery efforts, the country remains one of the poorest in the world. Climate change is already impacting agriculture and farming in Liberia. It is becoming increasingly difficult to identify the optimal time to plant crops. This results in lower yields and increases the vulnerability of farmers. Reduced soil moisture is also a factor in suboptimal cereal yields. Rainfall changes and temperature increases have also resulted in more pests, weeds, and animal diseases. Increasing flooding and salinity in coastal regions are also climate change factors that can undermine agricultural development.

### Project activities and Expected Impacts

The project will address the above barriers, thereby supporting the ongoing process to revitalize the agriculture sector, and ensure that adaptation to climate change is integrated into this process. Vulnerability reduction will be achieved through outcomes including: 1) integrating concerns into relevant policies and planning processes at the state and national levels; 2) developing comprehensive capacity for individuals in national agencies focusing on agriculture and in pilot counties and farmers; 3) demonstrating risk reduction strategies and measures at pilot sites; 4) strengthening technical capacity to integrate climate change risk management into farmer level agricultural capacity; and e) capturing and disseminating lessons learned.

The project will strengthen technical capacities in key sectors, notably agricultural planning and agricultural practices in poor communities. Other benefits will include the development of social and organizational capacity and general awareness about the adverse impact of climate change. The project will also promote a programmatic approach to adaptation planning among various stakeholders and facilitate the mainstreaming of climate risk reduction into agricultural planning frameworks, policies, and programs in Liberia. Several agriculture-based communities will have adapted to climate change. The project will also support future up-scaling and replication.

The project will achieve these goals through two interlinked components, as follows:

**Component 1: Capacity Development.** The project will create an enabling environment for sustainable land management through mainstreaming and developing capacities for sustainable agriculture through a broad-based participatory process.

**Component 2: Enhancing resilience to climate change by mainstreaming adaptation concerns into agricultural sector development.** Investments at demonstration sites (Panta and Gbarzon districts) involve the incorporation of an agro-ecosystem resilience approach. Potential adaptation measures include building climate change resilience for lowland rice and building resilience for upland shifting agriculture (using legumes, especially maize). This component will also aim to replicate lessons learned in pilot sites and inspire country level agricultural and development plans to include climate change considerations in the future.





## Climate change adaptation project in the areas of watershed management and water retention

### Country background and vulnerabilities

Senegal includes desert in the north and a moist, tropical in the south. The population highly depends on natural resources. Recent climate change impacts have placed a lot of stress and pressure on these resources, leading to increased ecosystem and land degradation. Rural poor people in the country are already vulnerable to non-climate stressors. As a result of climate change they have become poorer and more vulnerable. Moreover, the key pillars of the economy are constantly threatened by climate change, namely water resources, agriculture, and coastal areas.

### Project Activities and Expected Impacts

The project seeks to increase the resilience of agricultural production systems and associated value chains to climate impacts in the water sector, by ensuring the supply and availability of water for agricultural use in a scenario of increasing climate change-induced water scarcity. By targeting a climate vulnerable resource key to sustain agriculture, the project will contribute to meet food security and rural livelihoods objectives undermined by the effects of climate change. The project will be articulated around four components:

**Component 1:** Capacity building, awareness raising, and knowledge management at national level. Expected outcomes include increasing awareness of policy makers and national stakeholders on climate effects on agriculture, a better integrating climate

change into sectoral policies for water and agricultural management practices, and disseminating adaptation lessons learned.

**Component 2:** Water harvesting and watershed management. Key outcomes include the restoration of the hydrodynamic exchange of surface water and groundwater and integrated management of water harvesting structures and their production environment.

**Component 3:** Water conservation and efficient irrigation. This component aims at promoting efficient use of water through the building of 15 wells, seeding of 10 retention basins, introduction of 60 apiculture hives per basin; treating 100 ha of secondary rice plots through leveling, casierage and drainage, and producing 10,000 vitro plants.

**Component 4:** Monitoring and evaluation. Quantitative and qualitative assessments of water resources will be completed as well as the monitoring of climate change impact on the agroecological units.

The following benefits are expected: enhanced adaptive capacity of water resources and production systems; sustained livelihoods and improved food security; increased technical capacity of local technicians to maintain oriented facilities, namely water retention basins; sustainable ecosystems and adaptation-centered water retention and management infrastructures; enhanced knowledge on sustainable water-use and irrigation management; enhanced adaptive response of agricultural production systems to water scarcity through adaptive irrigation and water-saving techniques; and monitoring of adaptation progresses.



## Enhancing Climate Risk Management and Adaptation in Burundi (ECRAMB)

### Country Background and Vulnerabilities

Burundi is a densely populated African country. The country has an economy mainly based on agriculture, which employs more than 90 percent of the population. The majority of farmers live on subsistence farming; agriculture that is always at the mercy of climate variability (precipitation and temperature changes). The absence of urgent action on mitigation and adaptation to climate change could exacerbate the vulnerability of vital sectors, especially watershed erosion phenomenon, causing landslides, great losses of land for cultivation, and soil fertility.

### Project Activities and Expected Impacts

The project will reduce vulnerability to the adverse impacts of climate change, including variability, at local and national levels by targeting the capacity building at the local level and also national policies. It will also increase the adaptive capacity to respond to the impacts of climate change, including variability, at local and national levels through the capacity building and investment in the upgrading of the meteorological network. It will also promote transfer and adoption of adaptation technology such as rainwater harvesting at the local level.

The following components will serve to achieve the project's objectives:

**Component 1:** Investment in meteorological and hydrological field. The project will rectify the situation by strengthening the technical, human, and material abilities of Geographical Institute of

Burundi to be able to develop, over time and space, rapid warning systems further to risks related to climate variability on one hand and to propose adaptation strategies. It will strive for the rehabilitation and extension of National Meteorological and Hydrological stations and stakeholders training at all levels.

**Component 2:** Capacity building of stakeholders to mitigate and adapt to climate change. The project aims at reversing the current trend by building technical capacity of stakeholders in terms of mitigation and adaptation to climate change. Outreach tools and practices for adaptation will be developed and disseminated.

**Component 3:** Management and dissemination of knowledge, learned lessons, and best practices in the project area. This project contributes to the rehabilitation of degraded lands through integrated planning of watersheds. This approach is to reforest the denuded peaks, antierosive plan on farms to reduce soil loss because of erosion and installation of herbs and shrubs on these anti-erosive devices. Collection techniques and soil and water conservation as well as the small irrigation will be promoted in pilot sites and disseminated widely in the future. Improved inputs, short-cycle crops and drought and flood tolerant varieties adapted to climate variability will be disseminated in the region.

**Component 4:** Project Management. The project will be managed by the project implementation team for the Watershed Management project (PABV), of the African Development Bank, which will benefit from its experience in managing the funds and the equipment, offices, vehicles and some staff.





## Adaptation in the coastal zone of Mozambique

### Country Background and Vulnerabilities

Climate change-related sea-level rise, increase in mean sea temperature, increasing intensity and frequency of tropical cyclones and storm surges are likely to continue to have major adverse impacts on the Mozambique coastline. Furthermore changes in mean sea temperature may contribute to a shift in geographical location of cyclones on the Mozambique coastline.

The majority of coastal communities lack technical capacity and the physical and financial resources to adapt to and overcome climate change and climate variability, particularly problems associated with climate change-induced coastal erosion. Most of the poor and rural population situated in coastal zones depend on coastal resources for subsistence and livelihoods. For this reason, these populations are particularly vulnerable to the adverse impacts of climate change.

### Project Activities and Expected Impacts

This project seeks to support Mozambique to increase resilience to climate change through both immediate and long-term adaptation measures in development policies, plans, programs, projects, and actions. Its objective is to develop the capacity of communities living in coastal zones to manage climate change by i) generating climate change risk and adaptation options analysis and mainstreaming it into policies, investment plans, and sector budgets at the national and subnational level, ii) piloting demonstration projects to increase capacity of communities living in the coastal zone to cope with climate change impacts and to improve coastal

ecosystem resilience to climate change, and iii) promoting knowledge management to enable replication of adaptation measures in coastal zones.

The project will contribute to better environmental sustainability, food security and gender equality. Adaptation benefits will be produced by two project components, as follows:

**Component 1:** Climate risk information developed, mainstreaming into land-use planning, guidelines, development of policy guidance, national and community-level training on climate risk management. Main outcome of this component is to integrate coastal climate change risks into key decision-making processes at the local, subnational, and national levels.

**Component 2:** Implementation of adaptation measures at household and community level and results disseminated nationally. This component aims to improve adaptive capacity of coastal communities and enhance the resilience of coastal zones by implementing household-level and community-level adaptation measures. Micro-financing institutions will be the delivery agents at the household level, providing credit and other financial products, such as insurance to start-up climate resilient enterprises that can generate livelihoods and income less affected by climate change. Community-level adaptation investment plans will be developed comprising of priority infrastructure and or ecosystem enhancement and protection measures. This project will implement pilot demonstrations in a total of seven communities in the Pemba, Pebane and Inharrime municipalities in relation to household-level livelihoods' resilience, including livelihoods diversification and community-level adaptation measures.



## Building adaptive capacity and resilience to climate change in Afghanistan

Afghanistan is experiencing an increase in the number and intensity of droughts, as well as more frequent flooding events as a result of increased climate variability and the melting of glaciers in the highland regions. The climate change induced problems facing Afghanistan are twofold. Firstly, it is predicted that the incidence of extreme weather events and droughts will increase, as will climate change-linked disasters, such as glacial lake outflows. These changes are likely to adversely affect natural ecosystems, agriculture and community livelihoods throughout the country. Secondly, national structures, including communities, district leaders, researchers and government agencies currently lack the capacity to plan for, overcome and withstand the anticipated climate change-related threats.

### Project Activities and Expected Impacts

The project will alleviate critical barriers that exacerbate communities' vulnerability to climate change, and that prevent effective adaptation at the local and national levels. It is responding to Afghanistan's principal identified climate change adaptation priorities. These local-level interventions will ensure the development of capacity within communities and local authorities to adapt to climate change. Linkages between the national interventions and the local level interventions will be established through knowledge transfer between different stakeholders.

By implementing an adaptive learning approach throughout the project implementation and ensuring clear communication between multiple

sectors (including NGOs, government agencies and ministries, local communities and international partners), the project will enhance the resilience of Afghanistan, and facilitate adaptation to climate change impacts at the local, provincial and national levels. The selected pilot sites for this project are Badakhshan Province, Daykundi Province, and Balkh Province.

The project will achieve its objective through four delineated components:

**Component 1:** Climate change risk assessment, monitoring, and forecasting information. This component will increase capacity and knowledge base for assessment, monitoring, and forecasting of climate change-induced risks to water in Afghanistan.

**Component 2:** Climate change adaptation and response strategies. This component aims to integrate climate risks into relevant policies, plans, and programs.

**Component 3:** Practices for water resources and watershed management, piloted and tested in selected project sites. This component seeks to reduce vulnerability to climate change in the selected pilot sites through local institutional capacity building and concrete interventions for improved water use efficiency.

**Component 4:** Adaptive learning and dissemination of lessons learned and best practices. The final component will increase knowledge of good practices on increasing resilience to climate change-induced risks to water resources.





## Strengthening the adaptive capacity of most vulnerable São Tomé and Príncipe's livestock-keeping households

### Country Background and Vulnerabilities

The Democratic Republic of São Tomé and Príncipe is a small and very vulnerable country to the effects of climate change, due to the fragility of its ecosystem and low level of social-economic development. Increases in temperature and the decrease of rainfall are the country's greatest concerns, because these phenomena can have consequences on decreases in river flow and the amount of subterranean water. Economically, the negative impacts will be centered in energy production, in agriculture and livestock. Human health will also potentially suffer the effects of climate change with the appearance of some diseases and aggravation of others.

The country's vulnerabilities include the following:

- a) increase in temperature throughout the country;
- b) decrease in rainfall and the consequent decrease of the river flows in the East; c) lengthened dry seasons;
- d) landslides from torrential rains and e) destruction of the forests.

### Project activities and Expected Impacts

This project builds on the behavior of farmers in São Tomé and Príncipe, explores how they have adapted livestock management to climate change across the country over the years, and what support they need to enhance their mechanisms of coping with climate change. It will primarily support and supplement all these baseline programs by a) strengthening the adaptive capacity of most vulnerable livestock-

keeping households, b) mainstreaming adaptation options into livestock national development strategy, and c) building indigenous capacity on livestock systems adaptations to climate change through integrated sustainable livestock centers demonstrating breed's resilience, rangeland management, animal wastes management, bio-agriculture, and animal feed.

At the sectoral level, this project aims to strengthen food security. The specific objective is to improve resilience of the livestock systems in support of the productivity of stockbreeding.

The following interlinked components will be undertaken by this project:

**Component 1:** Strengthening the adaptive capacity of most vulnerable livestock-keeping households. Under this component on-the-ground investment activities will be financed to support smallholders livestock.

**Component 2:** Mainstreaming adaptation options into livestock national development strategy. This component particularly supports activities that help mainstream livestock adaptation measures into local and national development strategies and programs.

**Component 3:** Building indigenous demonstration capacity on livestock systems adaptations to climate change. Activities under this component would not occur under the baseline scenario. They include targeted participative demonstration and specific knowledge management. This component will be implemented in close collaboration with national and regional agriculture stations / institutes such as the São Tomé Taiwan Agriculture Station in the south and Nova Olinda.



## Integrated adaptation programme to combat the effects of climate change on agricultural production and food security in CAR

The Central African Republic (CAR) is a landlocked country. In recent years, CAR has suffered from political instability and endured recurring internal conflicts. Despite vast natural resources, the Central African Republic is one of the least developed countries in the world (LDC) group.

Over the coming years, climate change is expected to increasingly lead to changes in rainfall patterns with droughts occurring more frequently and lasting longer, and an increase in extreme events. The increase in temperature and the decrease in rainfall will lead to further reductions in duration of the rainy season, increasing evaporation and desiccation of already poor soils and impacting agricultural calendars. The phenomenon will affect food crops and cash crops.

### Project Activities and Expected Impacts

The project will seek to remove the above barriers preventing the successful implementation of the NAPA. Specific contributions toward the reduction of vulnerabilities to climate change will be achieved through the pursuit of specific project outcomes, including the following: i) policy, institutional and financial capacities developed and strengthened to plan for and manage climate change risks to the agricultural sector; ii) adapted agropastoral options implemented in key vulnerable areas; ii) knowledge/ experiences shared, capitalized and disseminated.

As such, the project will focus on creating the necessary enabling environments at all levels to support the integration of climate change risk management into national and local planning frameworks as well as in agricultural plans. A specific capacity building program will be developed to revitalize key support services from meteorological and agricultural departments to enable them to better provide the necessary tools and information to local decision makers, including farmers and pastoralists on the ground.

The project will undertake the following components:

**Component 1:** Policy development. Funding will be used to review and amend necessary development policies and strategies, including the Poverty Reduction Strategy Paper II, the Rural Development Strategy and local development plans of the three pilot sites. Furthermore, the capacity and organizational elements to address climate change resilient practices at all levels will be improved.

**Component 2:** Management of risk associated with climate vulnerability. Through this component, the Strategic Action Plan for the internalization of climate change risks into the conservation of Plant Genetic Resource for Food and Agriculture will be developed and climate resilient agropastoral practices and technologies will be put in place and disseminated.

**Component 3:** Analytical capacities and means strengthened. This component will develop key national capacities and means for undertaking analytical work on climate change and variability as well as long-term national capacities on climate change adaptation developed.





## Vulnerability assessment and adaptation programme for climate change in the coastal zone of Cambodia considering livelihood improvement and ecosystems

### Country background and vulnerabilities

Climate change will adversely impact communities, infrastructure, and natural ecosystems within the Cambodian coastal zone by a) increasing evapotranspiration rates and concomitantly reducing soil moisture levels (which will increase the severity of droughts when they occur), b) reducing agricultural production and thereby aggravating existing food security levels, c) reducing income streams, d) jeopardizing community livelihoods, e) increasing the extent and incidence of saline intrusion, which will adversely impact agriculture in low-lying coastal areas and contaminate drinking water wells, f) increasing the distribution of vector-borne diseases, g) saltwater inundation of coastal infrastructure, agriculture, natural ecosystems and community areas, and h) altering the salinity of estuarine water on which mangrove species depend, which may lead to the death of mangrove forests in certain areas.

### Project Activities and Expected Impacts

The project seeks to reduce the vulnerability of coastal communities to the impacts of climate change by strengthening policy and science, and demonstrating targeted local interventions to increase ecosystem resilience. The overall goal of the project is to reduce coastal vulnerability to climate change impacts on agricultural systems and natural ecosystems within the coastal zone. The project's design is centered around meeting three immediate needs: rehabilitation of coastal protection infrastructure; community mangrove

restoration and sustainable use of natural resources; and contribute to adaptation priority assessment of needs for setbacks, vegetation buffers, and protection structures in coastal zones.

This will be achieved through the realization of the following outcomes:

1. Institutional capacity to assess climate change risks and integrate them into national development policies strengthened.
2. Adaptation planning in the coastal zone improved.
3. Vulnerability of productive systems to increased floods reduced.
4. Resilience of coastal buffers to climate change increased and livelihoods improved.

The project will work to increase the resilience of natural ecosystems, such as mangrove forests, along the coast (as well as their functioning as buffer systems) and reduce the vulnerability of coastal communities to climate change impacts and risks. To achieve this, the project will rehabilitate degraded mangrove forests, introduce alternative livelihoods, protect agricultural production systems, and raise awareness regarding climate change and appropriate adaptation mechanisms. By implementing on-the-ground investments in vulnerable areas, the project will create an enabling environment for effective adaptation in the coastal zone by providing policy advice and scientific tools for adaptation planning at the national and local levels.

The project will respond to the climate change impacts and climate variability adversely affecting the coastal zone by following three mutually supportive components: i) policy; ii) research (adaptation planning and risk assessments); and iii) demonstration of adaptation at the community level.



## Strengthening climate resilience and reducing disaster risk in agriculture to improve food security in Haiti post earthquake

### Country Background and Vulnerabilities Targeted

Haiti is ranked among the poorest countries in the world and is considered the poorest of the Western Hemisphere. Agriculture is a key economic activity in Haiti, employing 46 percent of the existing labor force, and sustaining 70 percent of the population. Haiti is particularly vulnerable to floods, hurricanes, and other hydro-meteorological disasters expected to intensify with climate change. Every two to three years, Haiti faces cyclones, storms, or tropical depressions that typically constitute the most fatal natural disasters resulting in floods, landslides, tidal waves, epidemics, loss of livestock, livelihoods and damaged or destroyed infrastructure and habitats.

### Project Activities and Expected Outputs

The project's objective is to increase resilience of vulnerable farmers, including their livelihoods and agro-ecosystems against the impacts of climate variability. The project will integrate disaster risk management and adaptation practices in the agricultural sector. It will implement an integrated strategy for adaptation in crop production-focused interventions with emphasis on the enhancement of rural smallholder food security and disaster risk management.

The project is designed around four components: strengthening local planting material and seed systems for multiplication and dissemination of quality seeds and planting material of climate resilient crop varieties; field testing and replicating climate-resilient practices for climate risk management in agriculture; promoting climate-resilient agricultural technologies and practices through Farmer Field Schools; and integrating climate change adaptation and disaster risk reduction into agricultural policies, programs, and institutions.

Expected adaptation impacts are the following:

- Local plant material and seed systems of climate resilient varieties functioning in a sustainable manner; plant material and seeds adopted by 20-30 percent of farmers in the target areas.
- Local capacities and location specific good practices options menu available for scaling-up farmer's adoption of climate resilient agriculture technologies and practices
- About 50 to 70 percent of all farming households in pilot communes have enhanced capacities in community-based disaster risk management and are aware of different adaptation options.
- Ecosystem services supporting crop production in areas maintained or improved under climate change and variability induced stress measured in crop yields (5 percent increase).
- Farmers participating in FFS are aware of climate change impacts on agricultural production and options of climate-resilient agricultural good practices; 250 to 300 farmers have adopted the practices in their own fields.
- The FFS are established as adaptation technology transfer and adoption approaches for climate resilient agriculture production, or are proven to be inadequate for the Haitian rural context.
- Disaster risk management and agriculture sectoral strategies, policies, and development plans include adaptation targets supported by budget allocations.
- National and local government institutions and agriculture development services providers coordinate capacity building and institutional strengthening processes to ensure responsiveness to needs from changing and variable climate involving local communes.





## Strengthening of the Gambia's climate change early warning systems

The Gambia is highly vulnerable to extreme climate events, such as high temperatures, rising sea-levels and irregular rainfall patterns that sometimes lead to droughts, and at other times, lead to flooding and inundation.

Climate change will negatively impact various sectors of the economy. For example, interannual droughts will have a negative impact on rice production as a result of salt water intrusion into the rice producing areas. Another example, it has been estimated that about 92 km. of land in the coastal zone will be inundated as a result of a one meter sea-level rise, leading to the loss of the entire city of Banjul.

### Project Activities and Expected Impacts

The project aims to adapt national development in the face of climate variability and change. The project objective is to enhance adaptive capacity and reduce vulnerability to climate change through a strengthened early warning and information sharing mechanism for a better informed decision making by government and affected population. The selected pilot sites are in the North Bank region. This will be addressed through the following outcomes:

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

The project will use pilot projects to show how properly packaged and well-targeted early warning

messages could help farmers and other stakeholders living in vulnerable eco-zones prepare for and adapt to climate change events, and then synthesize lessons learned for replication elsewhere. Project activities will be achieved through three interlinked components, as follows:

**Component 1:** Climate change information, monitoring, and early warning systems. Activities under this component have been designed to alleviate a number of infrastructural and human resources deficiencies that are impeding effective and efficient collection of relevant weather related information.

**Component 2:** Climate change information dissemination and communication to end users. The thrust of this component is to develop information and communication capacities at the National Hydro-Meteorological Services for packaging and sharing weather forecasts and early warning systems in ways that capture the attention of targeted stakeholders.

**Component 3:** Institutional capacity for climate change policies and protocols. This component will implement the following: production of climate hazard maps, sectoral risks and vulnerability maps; recommendations for the creation of an ad hoc climate change coordinating group; and the training for such group.

The project will contribute to the following adaptation benefits:

- Rehabilitation of hydro-meteorological stations and development of human resources capacities required for using them and interpreting collected and processed data
- More effective, efficient and targeted delivery of climate information, including early warnings
- Improved and timely preparedness and responses of various stakeholders to forecast climate linked risks and vulnerabilities

## Programmatic approach— Sahel and West Africa program in support of Great Green Wall Initiative

This program supports the implementation of a country-driven vision for integrated natural resource management for sustainable and climate-resilient development in the Sahel region. The program responds to a series of high level ministerial meetings through which countries in the Sahel region have consistently called for an international partnership to implement their vision. The program builds on a series of baseline investments amounting to \$1.8 billion in cofinancing in 12 countries. The investments cover agriculture, food security, disaster risk management, rural development, and watershed management. The program leverages GEF resources under System for Transparent Allocation of Resources (STAR) according to country allocations, as well as Least Developed Countries Fund and Special Climate Change Fund resources according to eligibilities and the principle of equitable access under the Least Developed Countries Fund. Each country will design a GEF project based on national level priorities for STAR resources and, where Least Developed Countries Fund and Special Climate Change Fund are utilized, in accordance with NAPA priorities and National Communications. The different projects will directly address the priorities of the Climate Change Adaptation Program, as well as the GEF Land Degradation, Biodiversity, and Climate Change focal areas. The program will also leverage incentive financing from the Sustainable Forest Management/Reducing Emissions from Deforestation and forest Degradation/Reducing Emissions from Deforestation and Forest Degradation (SFM/REDD+ Program) to increase focus on forest landscapes.

Overall, the program will support a multiscale integration of land-use options that contribute to global environment benefits and adaptation benefits in accordance with the objectives of the GEF focal

areas targeted for financing. With sustainable land management as a core element of the program, GEF funding in the land degradation focal area will catalyze a diverse range of practices that improve the flow of ecosystem services in production landscapes and watersheds. Financing under the climate change focal area will enhance the potential for carbon benefits in these landscapes, while the biodiversity focal area strengthens the management of key protected areas by improving linkages with other land uses at appropriate scales. Countries that access SFM/REDD+ incentive financing will specifically address challenges to safeguard forest habitats and the unique agro-forestry parklands in the Sahel.

As for climate change adaptation, Least Developed Countries Fund resources will be deployed to meet the most urgent and immediate adaptation needs as identified by the NAPAs in Chad (\$5 million), Ethiopia (\$5 million), Mali (\$5 million), Mauritania (\$3 million), and Togo (\$4 million). The Special Climate Change Fund, in turn, will support activities under the Nigeria Erosion and Watershed Management Project (NEWMAP), providing resources to finance the adaptation costs of improving the resilience of civil works in areas that are particularly vulnerable to the impacts of climate change.

The program presents a unique opportunity for countries to overcome recurrent concerns over co-financing, which have often hampered GEF programming in these countries. Furthermore, many of the projects included in the program will build on existing GEF investments, such as the SIP/TerrAfrica and early investments to implement the NAPAs, as well as the strong engagement by bilateral partners in the region. By aligning with these programs and by catalyzing additional investments, the program holds the potential to achieve transformative impact in accordance with the collective vision of all the countries involved. Three West African countries that have Sudano-Sahelian ecosystems (Ghana, Togo, and Benin) but are not directly involved in the GGWI agreed to be included in the program to benefit from the whole process.





## Increasing climate change resilience of Maldives through adaptation in tourism sector

### Country Background and Targeted Vulnerabilities

Tourism is the dominant sector of the Maldivian economy. Tourism operations are intimately connected to a diverse range of value chains that provide goods and services related to agriculture, fisheries, manufacturing, construction, energy, water, and waste management. Climate change affects the resilience, viability, and profitability of these value chains both directly and indirectly.

The major climate hazards to which tourism resorts in the Maldives are exposed regularly include windstorms, heavy rainfall, extreme temperatures and drought, sea swells, and storm surges. The combined effect of storm surges and tides, or storm tides are perceived as especially destructive by tourism resorts.

### Project Activities and Expected Impacts

This project supports the tourism sector with the required policy and regulatory guidance, skills, and knowledge to ensure that climate change-related risks are factored into day-to-day tourism operations. This project will create a platform for public/private partnerships between the government of Maldives and the tourism industry to facilitate private sector investments in climate change adaptation. It will develop the capacity of the Ministry of Tourism, Arts and Culture and tourism operators to identify climate risk issues in the tourism industry and address them. The project will develop climate-resilient building codes for over- and underwater structures on tourism resorts,

as well as policies and technical guidance for climate-resilient water resource management, waste water management, solid waste management, and energy service provision in tourism resorts. Finally, the project will develop capacity of the government and the tourism industry to assess the feasibility of market-based risk financing mechanisms and ensure that tangible private-sector investments are leveraged.

The project will result in the following outcomes. Outcome 1 addresses policy and intersectoral coordination gaps. The project will enable a review of climate-related risks and opportunities in existing tourism-related policies, laws, regulations, and licenses and provide recommendations on how to improve these policy instruments. Outcome 2 addresses key technical knowledge gaps in the management of freshwater resources, waste water streams, solid waste streams, and energy resources in tourism resorts under conditions of global warming. Outcome 3 focuses on the development of institutional and individual capacity in public and private tourism entities about climate risk financing and risk-transfer.

The project will achieve its goals through three components:

**Component 1:** Creating an enabling policy environment for adaptation investments in the tourism sector

**Component 2:** Developing capacity of the tourism sector to prioritize and implement climate change adaptation actions

**Component 3:** Developing capacity of the tourism sector to engage with climate risk financing instruments



## Community based flood and glacial lake outburst risk reduction

### Country Background and Vulnerabilities

Located in geologically young and unstable rugged terrains in the Himalayas, Nepal's natural environment and ecosystems are diverse and vulnerable. Nepal is one of the most disaster affected countries in the world. The country is exposed to multiple hazards, most prominently floods, landslides, windstorms, hailstorms, earthquakes, forest fires, glacial lake outburst floods and avalanches. In a rapidly changing climate, the Ministry of Home Affairs concluded that every year, more than 1 million people in Nepal will be vulnerable to climate-induced disasters, such as floods, landslides and drought. Partly as a result of these findings, the government of Nepal has become acutely conscious of the country's vulnerability to climate-induced hazards and integrated priority actions for climate-induced disaster risk management into a number of national policy processes.

### Project Activities and Expected Impacts

This project was designed to address the problem of glacial lake outbursts floods in the Himalayan region and enable comparative analysis of glacial lake outbursts floods threats and risk mitigation efforts in Nepal, Bhutan, India, and Pakistan. This comparative analysis found that a coordinated approach combining structural with sociological and community based methods is necessary to prepare vulnerable communities against the threat of glacial lake outbursts floods and glacier melts in the targeted subregion. The project has provided a community-based risk assessment of glacial lake outbursts floods risk from Imja Lake and Tsho Rolpa.

The project will be executed through two interlinked components:

**Component 1:** Glacier Lake Outburst Risk Reduction in the High Mountains. Expected activities for this component include the following: artificial lowering of the lake level in at least one hazardous glacier lake (such as Imja or Tsho Rolpa) through controlled drainage; strengthened connectivity of glacial lake outbursts floods monitoring and early warning systems; training of all vulnerable communities in at least one glacial lake outbursts floods-prone district (such as Solukhumbu or Dolakha) in flood preparedness and risk mitigation.

**Component 2:** Community-based Flood Risk Management in the Terai/Churia Range. Expected activities include the following: stabilization of hazard-prone slopes and river banks in selected communities through bio-dykes and gabion embankments; flood-proofing of communal water supply and storage facilities in selected communities; strengthening structural integrity of drainage systems in selected communities; and flood preparedness training for district and village development committees representatives, NGOs and community organizations in four-flood prone districts.

At the local level, the project will reduce vulnerability of communities in four districts of the Terai and Churia region to flooding hazards and reduce human and economic losses from catastrophic flooding events. In the high mountains, project resources will protect livelihoods and critical communal infrastructure downstream of Imja Lake / Tsho Rolpa from glacial lake outbursts floods. By focusing on investments which protect critical, shared community infrastructure from climate-related shocks and extreme events, the project financing will directly reduce potential for conflict, ensure equal access of community members to the benefits of adaptation-related investments, and counter existing trends of relocation. At the national level, the project will enable the government of Nepal to address important investment gaps in community-based climate risk reduction.



## Effective governance for small-scale rural infrastructure and disaster preparedness in a changing climate

### Country Background and Vulnerabilities

Lao PDR is endowed with abundant water resources for its agriculture, hydropower, fisheries, and domestic use. However, the volume of flow of the Mekong is characterized by considerable variations between the dry seasons and wet seasons. Therefore, local communities are already having to deal with difficult water situations, such as flooding landslides and drought. Climate change will amplify an already challenging environment for rural Lao society and increase vulnerability to water shortages as well as the loss of assets, lives and livelihoods from natural hazards. The available climate science indicates that dry seasons are likely to increase in length while wet season rainfall will occur in even shorter more intense intervals.

### Project Activities and Expected Impacts

This project seeks to improve local administrative systems affecting the provision and maintenance of small-scale rural infrastructure (including water and disaster preparedness) through participatory decision making that reflects the genuine needs of communities and natural systems vulnerable to climate risk. Such an objective will be achieved through the following components and activities:

**Component 1:** Inclusive planning, budgeting, and capacity development for reducing climate and disaster related risks. This component will enhance technical capacity for at least 250 province, district, and village officials, university staff, not-for-profit associations, local water and sanitation, and disaster management committees to understand and integrate climate risk information, including on climate-induced disasters, into local planning, investment and execution. Regular dialogues will be

established in at least six districts. District-level annual investment plans that integrate climate resilience, ecosystem based adaptation and disaster risk reduction measures will be implemented in at least six districts.

**Component 2:** Local investments for reducing climate risks. Climate-resistant water harvesting, storage, and distribution systems will be designed, built, and rehabilitated in at least 120 villages (80,000 people) based on projected changes in rainfall patterns and intensity. Village shelters and assembly points, evacuation channels, drainage, and other measures to promote resilience to local climate induced disasters will be built or rehabilitated in at least 120 villages based on projected changes in rainfall patterns and intensity. Codes and best practices for climate proofing small-scale rural infrastructure will be developed, integrated into existing guidelines, and disseminated.

**Component 3:** Natural assets (wetlands, forests, and other ecosystems in subcatchments) over at least 60,000 ha. are managed to ensure maintenance of critical ecosystem services, especially water provisioning, flood control, and protection under increasing climate change induced stresses. Resilience will be built by increasing natural retention and storage of surface water—natural wetland management, reforestation, and slope stabilization. Increases in groundwater infiltration and aquifer recharge will be achieved through gully plugging, terracing, check dams, and vegetation cover increase.

The project can be expected to deliver measureable socioeconomic benefits to at least 120 villages in six districts out of a total of nearly 2,500 villages in Savannakhet, Champassak and/or Khammouane provinces through measures to climate proof rural infrastructure and introduce new measures to diversify supply options. The total population of those directly benefitting from the project will be more than 80,000 based on an estimate of 700 persons per village.



## Strengthening the adaptive capacity and resilience of rural communities using micro watershed approaches to climate change and variability to attain sustainable food security

### Country Background and Targeted Vulnerabilities

Cambodia has huge endowments of natural resources and a geographic location offering potential comparative advantage for development in agriculture, livestock, forestry, and fisheries. Agriculture is the mainstay of the economy. The agriculture sector in Cambodia is vulnerable to climate change, especially worsened by climate variability and extreme events. Successive droughts and floods have resulted in a significant number of fatalities and considerable economic losses. Losses arising from floods have been further exacerbated by deforestation.

### Project Activities and Expected Impacts

The project will demonstrate the role of various watershed techniques to reduce climate risks. It will also demonstrate climate-resilient agricultural practices for increased productivity, and livelihoods diversification through alternative income generating activities. The project will support the following activities organized into four technical components:

**Component 1:** Integrating climate change adaptation into agricultural and food security policies and planning. This component seeks to i) increase the knowledge and understanding of impacts of climate change on agriculture and ii) mainstream climate change adaptation into agriculture, food security, and related policies. The ultimate outputs are static maps providing information on land and crop

suitability based on future land use and climate change predictions. Capacity building activities for decision makers and other stakeholders (from government, universities, and nongovernmental organizations) will be implemented to enhance their awareness and knowledge of climate change risks and best adaptation practices in agriculture and natural resource management.

**Component 2:** Participatory integrated micro watershed management to reduce climate impacts on natural resources and agriculture. This component seeks to reduce the impacts of floods and improve water availability in dry months through the adoption of integrated watershed management practices. Ten pilot micro watersheds, representing climatic disaster prone areas in various agro-ecological zones, will be selected. Communities in these pilot watersheds will be trained to develop integrated micro-watershed plans for implementation. The upstream micro watershed treatment component will adopt a sustainable landscape and forest management approach to improve upstream ecosystem services to reduce floods, droughts, and erosion.

**Component 3:** Demonstrating and promoting climate-resilient agricultural practices through farmer field schools. This component will raise farmers' awareness of climate change risks and impacts on agriculture and promote climate-resilient agricultural practices in order to reduce the risks.

**Component 4:** Piloting climate-resilient alternative livelihood options targeted at women. This component will contribute to the enhancement of livelihoods of women and their households thereby building their resilience to climate change and variability. This will be achieved through piloting selected alternative livelihoods/income generating activities in 10 watershed communities.





## Adapting Agriculture Production in Togo (ADAPT)

### Country Background and Targeted Vulnerabilities

Togo faces numerous environmental challenges and problems, most due to the country's rampant demography, rural poverty and poor consideration of the environmental dimension in sector-based plans and programs. The most visible signs of climate change impacts include the following: drying up, natural disasters, outbreaks of diseases, diminishing forest cover, extended erosion, salinization of the continental terminal of the coastal sedimentary basin, a generalized drop in the quality of water, and loss of soil fertility.

Togo's NAPA identifies seven main options in the area of strengthening the capacity of rural operators and producers exposed to climate change by supporting production and diversification, rational management of natural resources under threat, protection and securing of infrastructures and structural equipment at risk, and early warning of climate catastrophes.

### Project Activities and Expected Impacts

The project aims to lessen the impact of climate change on vulnerable rural groups, as well as on natural resources critical for sustaining agricultural production and increase food security. Support will be given to mainstreaming adaptation tools in selected agricultural production systems (maize, rice, and cassava) and to economic diversification in order to improve livelihood resilience (integrated livestock-crop systems and aquaculture). The project will support climate-proofing of tools to reduce climate change risks in development programmers, such as thematic studies, climate vulnerability mapping, and bringing agro-meteorological information to help informing decisions. As part of this activity, some support will be provided in the rehabilitation of meteorological stations equipment.

Finally, the project will contribute to create the capacity at the national level to respond and monitor climate change impact, as well as increasing the awareness of local communities on climate change. It will also cover the cost of improving data collection and monitoring by mapping vulnerable areas and establishing basic weather stations in relevant sites. This intervention is articulated around these components:

- Mainstream climate change adaptation tools in agricultural production systems
- Adapt vulnerable agricultural production systems to current and future climate impacts
- Promote information education and communication on climate change
- Climate-proof PADAT project (Project to Support Agricultural Development in Togo, supported by IFAD). This is the baseline project, which aims at raising productivity of small-scale growers of cassava, maize, and rice and enhancing value-added/marketing of their outputs.
- Support project management and monitoring and evaluation

The project will deliver socioeconomic benefits in the following areas: reduced food insecurity; improved livelihoods and local economies through improved agricultural productivity and raised incomes; new and diverse income-generating opportunities created; enhanced decision-making of small-scale farmers based on agro-meteorological data; empowerment of small scale farmers to cope with climate variability and natural disasters; and contribution of agriculture to local and national economy made less unstable.



## Shire Natural Ecosystems Management Project (LDCF and GEF Trust Fund)

### Country Background and Targeted Vulnerabilities

This project will mainstream natural habitat and biodiversity management within the Shire River Basin Management Project (SRBMP), a \$100 million IDA credit. Many of the project activities are consistent with national adaptation priorities, including reforestation, increasing agricultural productivity and resilience through sustainable land and water management technologies, strengthening hydromet monitoring systems, and upgrading water infrastructure for increased storage and flow regulation capacity.

Malawi's NAPA identified five key areas for action. The project will address NAPA priority areas (i) and (v) by enhancing flood protection measures with co-management of important wetlands in the lower Shire; and enhancing natural flood mitigation services and resilient livelihoods of some of Malawi's most climate-vulnerable people.

### Project Activities and Expected Impacts

This is a multitrust fund project. The project's funds will cofinance investments in integrated community flood resilience in the lower Shire floodplain through a combination of "last mile" connectivity with flood warning systems, capacity building for community flood response, small scale infrastructure, and comanagement of the 120,000 ha. Elephant Marshes.

The project's activities would provide for the management of ecological infrastructure (in particular natural ecosystems and biodiversity) to be fully mainstreamed within the SRBMP. The project will establish participatory management planning for the 1,200 km<sup>2</sup> Elephant Marshes, including pilot community resource management activities. This will pave the way for further investments, not least through the second phase SRBMP and potentially registration of the wetlands within the Malawian protected areas system.

The Marshes occupy a significant proportion of the lower Shire floodplain, and are important both for their hydrological function within the floodplain in absorbing floodwaters, and also for their potential for supporting enhanced climate-resilient livelihoods in the form of fisheries and tourism. Management of the wetlands will complement IDA-funded community preparedness and protective infrastructure investments to form a comprehensive flood resilience program that integrates community preparedness, physical and ecological infrastructure investments and enhancement of natural-resource dependent livelihoods. The project's investments will leverage additional IDA resources in support of complementary livelihood activities around the Marshes.

At national level, the SRBMP will be implemented by the Ministry of Irrigation and Water Management — the agency with state management responsibility for water resources. The Department of Disaster Management Affairs is mandated with coordinating disaster response and resilience, but must work with other agencies on the ground in areas such as infrastructure and natural resource management.





## Adaptation of Small-scale Agriculture Production (ASAP)

### Country Background and Targeted Vulnerabilities

The agricultural sector of Lesotho provides 15 percent of the country's gross domestic product; the country produces only 30 percent of its total food requirements in a normal year. Most of the farmers are subsistence, food insecurity is chronic, and appears to have increased in the past few years because of low levels of agricultural productivity and crop failures. As emphasized in Lesotho's NAPA, climate change is expected to put agriculture under increased stress. Warmer future climate conditions over Lesotho are predicted with lower precipitation. Shifts in precipitation patterns will have serious impacts on agro-ecological conditions in the country as the growing season is pushed forward and perhaps shortened. Crop failures are caused by recurrent droughts and associated problems of land degradation, soil erosion, and inefficient water control and management.

As outlined in the NAPA, the rationale for the project is that current development initiatives are exploiting the country's potential to increase the yields of crops and fruit trees. This potential has been affected by such climate extremes and hazards as hail, frost, and higher temperature.

### Project Activities and Expected Impacts

The project aims to increase the resilience of small-scale agriculture to climate change impacts by promoting climate-proofed investments for agriculture-based development, as well as by enhancing the resilience of agricultural productivity under increased climate variability. It has been designed to support the implementation of

agriculture-related NAPA priorities: crop production and water resources for agriculture. It aims to achieve its objective through two interlinked components, as follows:

Reduced vulnerability of agricultural production. Expected outputs under this component are the following: vulnerability mapping and related adaptation measures included in Agricultural Investment Plans; introduction of natural resource management adaptive measures to minimize climate impacts on natural assets and sustain agricultural production; and promotion of innovative practices and technologies to increase efficiency of smallholder production promoted through a demand-led approach.

Enhanced adaptive capacity to support agricultural production in the context of climate change. Expected outputs include the following: monitoring and evaluation systems in place to disseminate timely climate adaptation information related to agriculture; inclusion of climate/meteo information in agricultural information system; and increased capacity of Meteorological Service and Ministry of Agriculture staff on climate change and agriculture linkages.

The baseline for this Least Developed Country Fund project is the Smallholder Agriculture Development Programme (SADP), which focuses on the development of market linkages and the promotion of market-oriented crop and livestock production. The impacts of climate change on the agricultural production systems are not addressed directly as a risk to the agricultural sector. The Least Developed Country Fund-supported activities will integrate NAPA-based measures that will mitigate the impact and reduce the risk of climate change on agricultural production.



## Strengthening the resilience of small scale rural infrastructure and local government systems to climatic variability and risk

### Country Background and Targeted Vulnerabilities

Timor Leste is a small island developing state and one of the world's newest nations. Its population is largely dependent on subsistence agriculture. With a geographical context that locates the country both in Southeast Asia and on the western extremity of the Pacific, Timor Leste is vulnerable to many of the habitual climatic phenomena and resulting impacts that are hampering the growth and development of most nations in this region. These include sea level rise, increasing climatic variability, and increasing intensity of extreme events, partially linked to the El Niño/Southern Oscillation weather phenomenon.

The recently completed NAPA (2010) summarizes the risks associated with climate change as follow: overall increase of temperature without significant variability across the seasons; extreme temperature events are expected to increase in intensity and length; increase in mean rainfall values; dry season expected to become drier; extreme rainfall events expected to increase in intensity and decline in frequency; increase of sea-level rise; tropical cyclones expected to be more intense in nature; and ocean expected to become more acid. These impacts result in flooding and landslides on critical rural infrastructure, which further degrade assets, particularly water supply infrastructure, drainage, embankment and river protection structures, and community feeder roads and bridges that connect with the network of roads.

### Project Activities and Expected Impacts

The objective of the project is to design and implement critical small-scale rural infrastructure through participatory approaches and strengthened local governance systems, reflecting the needs of communities vulnerable to increasing climate risks.

This will be achieved through the following components:

- Systematic use of climate risk information. The project's resources will improve the Ministry of Economy and Development's expertise and ability to provide advice and information on climate risks. The existing capacity within the national climate team will be strengthened to include integration of top down climate scenario information.
- Inclusive local planning and budgeting to reduce climate risks. This will require sensitization of community representatives and local officials on climate risk issues as they relate to local infrastructure; a package of training and practical advice on integrating climate risk into planning for district and subdistrict assemblies; and raise awareness and technical know-how of local contractors in the infrastructure sector, in supporting climate-resilient construction design and building techniques.
- Physical investments to reduce climate risks. The project will finance the additional costs attributed to climate change in order to secure the long term viability of the government's Local Development Programme, as well as the District Development Fund.

There are several government, UNDP, and other development partner supported projects that form the baseline for this project. These include the following ongoing measures: strengthening the Ministry of Economy and Development's role and competencies in providing national leadership on climate change and its impacts on development; improving local governance by channeling increasing financial resources to local and communities levels using national procurement and financial management systems; and strengthening the country's ability to assess critical natural resources (such as groundwater).





## Effective and responsive island-level governance to secure and diversify climate resilient marine-based coastal livelihoods and enhance climate hazard response capacity

### Country Background and Targeted Vulnerabilities

Tuvalu is the fourth smallest nation in the world with 9,561 people scattered across nine inhabited islands. The challenges Tuvalu faces in the context of climate change include sea level rise and rising atmospheric and surface ocean temperatures. Sea-level rise is a direct threat to lives, assets, and livelihoods in coastal regions (in which 90 percent of the country's population resides) and a cause of salination of scarce groundwater resources. Rising surface ocean temperatures reduce productivity of marine resource, through loss of marine habitats (coral bleaching) and shift in fish population.

Three out of nine islands of Tuvalu (Nanumaga, Niutao and Niulakita) are table reef islands that have a lagoon within the island. The lagoon provides a safe haven for marine resources collection—an important livelihood activity for women and the elderly. However, these islands are vulnerable to tropical cyclones, storm surges, and sea swells from outer ocean, along with overflowing of water from the lagoon during high/king tides. The level of contribution of subsistence food production in Tuvalu is higher than many other neighboring Pacific countries. Marine resources are declining because of combined factors of climate change and anthropogenic reasons. Most Tuvaluan households engage in household-level fishing and collection activity to supplement their diet, and near-shore fishing is the main source of fish catch.

### Project Activities and Expected Impacts

The project aims to strengthen resilience of island communities to climate change variability and risks

through participatory island-level planning, budgeting, and execution and community-led investments. Consistent with priority adaptation strategies identified by the Tuvalu NAPA, the project requests to finance the additional costs of increasing the resilience of coastal communities from climate variability and risks through promoting diversified and climate resilient marine-based coastal livelihoods (Component 1) and increasing responsive capacity of communities to anticipated increase in climate change induced hazards (Component 2), within the context of rendering local planning and investment processes in all islands of Tuvalu more climate resilient (Component 3).

Project resources will be used to implement community-based adaptation measures in 18 villages, benefiting 2,000 people, to strengthen and diversify marine-based coastal livelihoods against future impacts of climate change. The adaptation measures will include, but not be limited to, the following: installation of near-shore cage farming for mariculture; establishment of in-land spawning or hatchery sites for shellfish and brackish aquaculture; introduction of climate resilient seaweed production; or community-level construction of natural and low-cost wave attenuation structures. The project will also support concrete investments to enhance the institutional capacity to effectively respond to increasing and intensifying climate change induced risks. Finally, the project will transform the whole island development process into a more climate resilient process by building on existing such initiatives as Support for Local Governance Project Phase II and NAPA I project (LDCF/UNDP).

The project will provide for capacity development exercises for at least 100 national and island officials, local communities, CSOs, island disaster committees, Women's Council, youth groups and other stakeholders, to better understand climate risks for future island development and to integrate priority adaptation measures.



## Integrating community-based adaptation into afforestation and reforestation programs in Bangladesh

### Country Background and Targeted Vulnerabilities

The government of Bangladesh proposed to allocate a second tranche of Least Developed Countries Fund resources to upscale and replicate community-based adaptation in current and planned afforestation programs of the Forest Department under the Ministry of Environment and Forests. This follows a strategic decision by the government to concentrate Least Developed Countries Fund resources on the achievement of NAPA priority 1, rather than spreading limited Least Developed Countries Fund resources too thinly across too many different sectors.

Bangladesh has over three decades of experience with coastal greenbelt projects. As part of the current Forest Management Plan, newly accreted land (that is, land that emerges on the basis of sedimentation processes in the river delta) is under the administration of the Forestry Department for 20 years, where it is subject to new afforestation and reforestation activities. However, most afforestation projects achieve limited long-term impact in vulnerability reduction because these projects generally fail to engage communities beyond once-off paid labor, neglect options to provide alternative livelihood options, neglect the integration of diversified mangrove and nonmangrove varieties that can buffer changing climatic conditions, and are overall not innovative enough to leverage additional resilience benefits for local communities.

### Project Activities and Expected Impacts

Against this backdrop, the project aims to integrate community-based adaptation and livelihood diversification options into the baseline project

“Poverty Alleviation through Social Forestry.” This baseline project has a financial envelope of \$15,670,000 and is implemented by the Bangladesh Forest Department (BFD) under the Ministry of Environment and Forests (MoEF). Least Developed Countries Fund funding will support community-based adaptation in connection with the rollout of baseline afforestation programs in order to reduce vulnerability of communities to climate change. Bangladesh’s first NAPA follow-up project (LDCF/UNDP), which focuses on community-based afforestation in the coastal districts of Patuakhali, Bhola, Noakhali and Chittagong, is considered as the starting point to showcase how such dovetailing can take place.

This second Least Developed Countries Fund project will propagate community-based adaptation and livelihood diversification measures (such as integrated fish/fruit/forest-farming; diversified livestock rearing, salt tolerant/flood resistant crop farming, measures to protect aquaculture and freshwater supply infrastructure from flooding and storm events, and measures to provide safe havens for livestock) in 20 Upazilas (sub-districts) across 19 coastal districts (Cox’s Bazar, Chittagong, Noakhali, Lakshimpur, Pakuakhali, Barguna, Bhola, Jhalokhati, Pirojpur, Feni, Barishal, Chandpur, Bagerhat, Khulna, Satkhira, Shariatpur, Madaripur, Faridpur and Gopalganj). In parallel, trial plantations will be established in four coastal districts to display resilient combinations of, and planting patterns for, mangrove varieties that demonstrate better performance in withstanding climatic variations and extremes (pertaining to effects of salinity, inundations, temperature, humidity, or wind speed). Finally, through engagement and training of community-based organizations, the project will develop institutional capacity at the local level that will support communities political engagement, advocacy, and participation in participatory, forward-looking risk management.



## Strengthening farmers communities livelihoods resilience against climate changes in the Guinean Prefectures of Gaoual, Koundara and Mali

### Country Background and Targeted Vulnerabilities

Agriculture and livestock are the main economic activities in the prefectures of Gaoual, Koundara, and Mali in Guinea. Farmers represent 79.7 percent of the active population of the Mali region, which hosts the prefecture of Mali and 68.6 percent of the active population of the region of Boke, which hosts the prefectures of Gaoual and Koundara. The agricultural sector is also the main source of revenues in these two regions. While their importance for the economy and community livelihoods is undeniable, agriculture and livestock farming in Gaoual, Koundara and Mali remain of subsistence, dependent entirely on the natural resource potential and characterized by archaic and nonenvironmentally friendly practices. The agriculture and livestock production are currently facing several constraints, which limit their productivity and render them highly vulnerable to any external shock including climate effects.

Guinea's NAPA reveals that in North Western Guinea (hosting the prefectures referred above) temperatures will rise by .3°C and 4.6°C and rain will decrease by 31 percent to 40 percent at the 2025, 2050, 2075, and 2100 horizons. Water courses will likely decrease until 50 percent comparatively to the mean current rate of flow in the Northern part of the country at 2100 horizon and evapotranspiration will increase. Land and forest degradation will be exacerbated and livestock will be deeply affected in this region.

### Project Activities and Expected Impacts

This project will strengthen adaptive capacity of

vulnerable populations in the prefectures of Gaoual, Koundara, and Mali (GKM) to the additional risks posed by the increased intensity and frequency of drought. Related expected outcomes include the following: mainstreamed adaptation in broader development frameworks at country level and in targeted vulnerable areas; increased knowledge and understanding of climate variability and change-induced risks at country level and in targeted vulnerable areas; and reduce vulnerability in development sectors. The project is arranged around the following components:

- Local authorities are technically strengthened to promote climate resilient local development: the project will support the integration of climate change considerations in the implementation of the National Policy for Agriculture Development action plan through the Local Development Plans, Annual Investment Programs, and community budgets in the 15 more vulnerable communities of GKM.
- Climate change information systems are established to guide climate resilient agroforestry practices. The project will support an agro-meteorological action plan in GKM to determine information needed for a climate-resilient agro-forestry and for capacity building, as well as an agro-hydro-climatic zoning of the prefectures of GKM to elaborate climate resilient plans and strategies for agroforestry.
- Promote climate-resilient agro-forestry in the prefectures of GKM to increase community livelihood resilience. The project will provide communities with support aiming to integrate climate resilient agro-sylvo-pastoral activities and livelihoods into local development planning processes.

The project will be executed by Ministry of Environment, Water and Forestry.



## Building adaptive capacity to catalyze active public and private sector participation to manage the exposure and sensitivity of water supply services to climate change in Sierra Leone

### Country Background and Targeted Vulnerabilities

In Sierra Leone, climate change is expected to decrease stream flow and ground water recharge and reduced annual average rainfall and run-off would aggravate desertification. The main water supply to Freetown is vulnerable as evidence highlighted in the NAPA suggests; the rains appear to be becoming less predictable. Indicators of the impact of unpredictable but declining quantities of rainfall are all too apparent: low rainfall in June 2006 resulted in the water level at Freetown's principal water source reaching a critical point resulting in widespread rationing. This shortfall highlights the long-term threat to the security of the capital's water supply. Scarcity of surface water during the dry season limits the use of low lift pumps. Presently, wells are dug deeper during this season because of the low level of the water table. In the Freetown area, crudely built carts are used by children to transport water in five- gallon plastic containers. Women travel several kilometers outside the main city to fetch water, resulting in serious human development impacts. Few people have the economic means to afford water storage tanks in their homes.

### Project Activities and Expected Impacts

The goal of this project is to enhance adaptive capacity of decision makers in the public and private sector involved in water provision to plan for and respond to climate change risks on water resources. Project activities are centered around two components, as follows:

- Integrating climate change considerations into water policies. The main outcome is to revise critical public policies governing the management of water resources to incentivize climate smart investment by the private sector.
- Strengthening the resilience of water supply systems to anticipated climate change risks. The main outcome is to make resilient the existing water supply storage and distribution infrastructure against climate change induced risks (droughts or floods) in Freetown and at least three rural districts with the support of private sector.

This project is consistent with three of the priorities identified in Sierra Leone's NAPA, namely: capacity building of the Meteorological Department through training of personnel for the country's adaptation to climate change; institutional strengthening of water resources sector; and promotion of rain water harvesting and development of integrated management system for fresh water bodies.

The project will enable the principal baseline initiative in water resources management in Sierra Leone, the Department For International Development of UK -supported water and sanitation program to diversify and protect water supply, storage and dissemination infrastructure from climate change induced risks. The project will promote water conservation to reduce the vulnerability of poorest groups in Freetown and selected districts.

In Freetown, resources will be provided to design and build climate-resilient water harvesting, storage, and distribution systems in vulnerable households and public services (schools or hospitals). In rural area, resources will support the rehabilitation and construction of at least 30 gravity fed water systems, 100 small water reservoirs that are resilient and that provide water for communities and their economic activities during water shortages in at least three rural districts in Northern, Eastern, and Southern regions.



## Enhancing resilience of vulnerable coastal areas and communities to climate change in the Republic of The Gambia

### Country Background and Targeted Vulnerabilities

The Gambia's coastal areas consist of estuarine, intertidal, and oceanic ecosystems that border the Atlantic Ocean and extend to the brackish water environment that borders the Gambia River up to 200 km. from its mouth—to the Miniminiang bolong on the north bank and the Mootah Point on the south bank. The Gambia's coastal areas are severely affected by climate change and variability in two major ways namely coastal erosion owing to increased wave activity and physical drowning of low-lying areas as sea level rises. In each case the result is coastline recession and the physical loss of ecosystems and the services they provide. It is a consensus that the problem is likely to be exacerbated, specifically by the increase in sea levels and frequency of storm surges.

With a large and growing population in the coastal zone and a low adaptive capacity, The Gambia is highly vulnerable to sea-level rise.

### Project Activities and Expected Impacts

This project is fully in line with the NAPA priorities of The Gambia specifically linked to coastal zones, fisheries, agriculture, and forest ecosystems sectors. It aims to remove urgent policy, institutional, individual, financial, and knowledge related barriers to effective climate risk management in the coastal zone of The Gambia. The project will strengthen resilience to climate change induced coastline degradation through additional measures that will protect critical economic assets and livelihoods (physical infrastructure and rice paddies) from erosion, salinization, and flooding.

The outcomes of the project are focused integrating climate risk management into key planning instruments, by strengthening human resource and institutional capacities, and by investing in climate resilient physical measures and livelihood strategies. The government faces coordination challenges in ensuring that these efforts are complementary and well aligned. The project will help to achieve this under Outcome 1, principally through the establishment of an enabling political, institutional, and administrative environment for advancing climate risk management in the coastal zone backed by strengthened research and monitoring capabilities.

While many past investments aimed at protecting critical economic assets from coastal erosion have largely been unsuccessful, Outcome 2 will learn from these past failures and put in place cost effective and technically sound infrastructure, protecting both coastal installations and inland rice paddy from sea level rise related risks, and complement these with mangrove protection measures, bringing such benefits as physical protection, an improved asset base for local communities, and a source of longer-term carbon sequestration.

Community benefits and support will be extended under Outcome 3 through the provision of more tolerant varieties and methods in both paddy cultivation and artisanal fisheries, backed by the promotion of alternative livelihoods so as to reduce dependence on vulnerable traditional livelihood systems.

The national implementing partner for this project is the National Environmental Agency, which will work in close collaboration with the Department of Water Resources and Department of Agriculture.



## Scaling up Community-Based Adaptation (CBA) in Niger

### Country Background and Targeted Vulnerabilities

In 2009, Niger benefited from funding under the Least Developed Countries Fund to implement urgent and priority interventions that will promote enhanced adaptive capacity of the agricultural sector to address the additional risks posed by climate change. This is a pilot project in nature, in which the primary purpose of the activities supported is to demonstrate how adaptation can be addressed practically in the agriculture sector across eight vulnerable communes. The intervention includes the implementation of a set of adaptation practices at community level to enhance the resilience food security of agricultural production systems. Other programs have been also initiated over recent years aimed at building the resilience of local seven communities to climate stressors, notably in the agricultural sector.

However, discussions with project managers and local partners have highlighted several bottlenecks to the scaling up of community-based adaptation in Niger such as limited local governance of climate changes to support communities' resilience. Such barriers are the following: limited local governance to support communities' resilience, lack of resources to comprehensively finance adaptation activities, limited finance for local communities and their institutions, and limited geographic coverage of existing community-based adaptation programs.

### Project Activities and Expected Impacts

This project will finance the additional costs of strengthening the responsiveness and adaptive capacity of administrative/technical support services at the commune-level to enable generation of a critical mass of climate-resilient communities and achieve more climate-resilient landscapes and economies in the poorest region of Niger, the

Maradi Region. The approach of the project is to develop an integrated and complementary strategy to promote territorial development in the context of climate change and attendant vulnerabilities, through the following components:

- Administrative and technical support services at the commune-level trained in climate risk management. The project will strengthen capacities of commune leaders, extension services, and community organizations to support climate-resilient economies.
- Implementation of measures to build communities' adaptive capacities. The project's resources will be used to support local communities to implement identified climate-resilient activities and practices in a phased approach across a critical mass of vulnerable communities.

Project beneficiaries will identify and implement technical practices aimed at enhancing agricultural activities with animal husbandry (agro-pastoralism), as well as supporting extra-agricultural productive activities in rural areas. These will enable poor households and those particularly vulnerable to climate change to earn sufficient income to offset the risks to their agricultural systems from climate change.

The project will build on the UN Maradi Joint Programme, CARE International's project Adaptation Learning Programme/Demonstrating Adaptation in the Department of Dakoro, Niger, and the United Nations Capital Development Fund (UNDCF) project Support to Local Economic Development in the Maradi region. The project will be executed by the National Council for Environmentally Sustainable Development (CNEDD), which will collaborate with Ministry of Environment and Desertification Control, Ministry of Animal Resources and Livestock Industries, Ministry of Agricultural Development, Ministry of Hydraulics, and Ministry of Decentralization.





## Landscape Approach to Forest Restoration and Conservation (LAFREC) Multi-Trust Fund Project (GEF Trust Fund and LDCF)

### Country Background and Targeted Vulnerabilities

Rwanda's habitats are highly varied and the country is well known for its rich biodiversity, with flagship species including gorillas and chimpanzees, and forest and wetland systems that support both wildlife and human population. Rwanda is home to three biodiversity hotspots and Lake Victoria (recognized as a freshwater biodiversity hotspot).

Regarding climate change effects, Rwanda's NAPA has highlighted the following six high priority options: integrate water resources management, aimed to reduce the vulnerability of ecosystems, population, and sectors resulting from the quantitative and qualitative shortage of water resources and the damages caused by the runoff due to climate change; set up information systems of hydro-agro-meteorologic early warning system and rapid intervention, which aims to improve such systems as a way to reduce exposure of the population and sectors to the risks of extreme events and climate catastrophes; promote income generating nonagricultural activities to improve the adaptation capacity of rural populations; promote intensive agriculture and animal husbandry; introduce varieties that better resist changes in environmental conditions through promotion of appropriate agricultural techniques; and develop alternative energy resources.

### Project Activities and Expected Impacts

This project will restore and maintain critical landscapes in Rwanda that provide global environmental benefits and contribute to enhanced

resilient economic development and livelihoods. This will be achieved through the conservation and sustainable use of biodiversity, increased forest cover, and climate change adaptation efforts together with combating land degradation. Therefore, this project has requested funding from GEF in the areas of biodiversity, land degradation, and sustainable forest management, as well as Least Developed Countries Fund resources for the adaptation component.

Based on the priorities identified under the Rwanda NAPA, the project will support Rwanda in becoming climate resilient through the following: (i) capacity building in the public sector and local communities to understand and address adaptation needs; (ii) in critically degraded areas, vulnerability assessments and investments in infrastructure to address immediate and longer term adaptation measures to avoid, minimize, and mitigate the impacts of floods and landslides, as well as those of extreme droughts; and (iii) adoption of more sustainable agricultural practices, such as intensive agriculture and animal husbandry, as well as of income generating nonagricultural activities as a way to reduce pressure on natural forests that lead to deforestation and land degradation.

The project is directly aimed at disaster risk reduction and enhancing water and food security through the rehabilitation of critical ecosystem functions (such as flood control and reduced soil erosion). Rehabilitative activities will need to be underpinned by secure livelihoods and a strong enabling institutional environment. Under this context, the project has the potential to add value to the Rwanda Landscape Approach to Forest Restoration and Conservation project. The project focuses on adaptation practices from sectors and ecosystems, risk analysis and vulnerability assessments, and strengthening of institutional capacity to implement adaptation measures, as well as promotion of diversified and strengthened livelihoods.



## Addressing the risk of climate-induced disasters through enhanced national and local capacity for effective actions

### Country Background and Targeted Vulnerabilities

Bhutan is one of the most disaster prone countries in Asia, irrespective of the presence of climate change. The country is exposed to multiple hazards, most prominently flash floods, landslides, windstorms, earthquakes, forest fires, and glacial lake outburst floods. In terms of relative exposure to flood risks (as percent of population), Bhutan ranks fourth highest in the region at 1.7 percent of the total population exposed to such risks. Climate change is likely to magnify the intensity and frequency of these hazards. The most pronounced consequences of climate change in Bhutan are two-fold: disruptions in the monsoonal system and increasing/intensifying trends of extreme hydro-meteorological hazards, both of which are obviously closely linked. These disturbances will amplify the socioeconomic challenges for the Bhutanese society, especially in rural areas where the majority of the population is engaged in rainfed agriculture and rampant poverty makes them least equipped to adapt to creeping changes in climate.

### Project Activities and Expected Impacts

The overarching objective of the second Least Developed Countries Fund project in Bhutan is to increase national, local, and community capacity to prepare for and respond to climate-induced multihazards to reduce potential losses of human lives, national economic infrastructure, livelihoods, and livelihood assets. Thanks to the first Least Developed Countries Fund project in Bhutan, the concept of disaster risk management at the

community level is gradually taking root reinforced by the trend of decentralization in general and the formulation of the Disaster Management Bill in specific. However, at the national level, the basic infrastructural and human resources capacity to manage climate information needs to be strengthened.

Consistent with priority adaptation strategies identified by the Bhutan NAPA, the proposed project will aim at:

- Reducing the human and material losses from sudden onset of climate induced disasters of flash floods and landslides in a commercial/ industrial/economic hub
- Enhancing climate resilience of Bhutanese community to climate induced hydro-meteorological hazards
- Strengthening national capacity to collect and disseminate relevant information about climate related risks and threats across community-based organizations and planners in climate sensitive policy sectors on a timely and reliable basis

These components, implemented within a single project framework in a coordinated and complementary manner, will have a transformational impact on how the Bhutanese society will address climate-induced multi-hazards in the future. This project will deliver measurable socioeconomic benefits to the most vulnerable populations in Bhutan both in a direct and indirect manner. In Component 3, Least Developed Countries Fund investments supported by real-time climate information will be made in all Dzongkhags in Bhutan and will provide a real-time safety net for thousands of Bhutanese.



## Regional initiative in Africa—strengthening climate information and early warning systems to support climate resilient development<sup>3</sup>

This UNDP initiative will support climate-resilient development and adaptation by strengthening weather and climate monitoring and early-warning systems in ten African countries: Tanzania, Ethiopia, Malawi, Uganda, Zambia, Benin, Burkina Faso, São Tomé and Príncipe, Sierra Leone and Liberia. These ten projects address the countries' urgent needs pertaining to hydro-meteorological services and early-warning systems, as identified in their NAPAs. The proposed activities are also aligned with the countries' Poverty Reduction Strategy Papers (PRSP), providing essential information and decision-support services to enable sustainable and resilient development in key sectors of the economy, notably agriculture, fisheries, transportation, and energy.

The Least Developed Countries Fund grant request amounts to \$49 million, including agency fees with expected cofinancing amounts to \$212 million. The proposed project will address gaps and vulnerabilities in the baseline initiatives to develop more accurate, more comprehensive, and more effective systems for monitoring, communicating, and applying weather and climate information for early warning as well as for medium and long-term development planning.

While tailored in accordance with country needs and circumstances, the projects are all structured around two broad components: (i) investments in weather and climate monitoring infrastructure, including hydrological and meteorological monitoring stations, radar for monitoring severe weather, upper-air monitoring stations for regional forecasts, and satellite monitoring equipment; and (ii) measures to integrate climate information into development plans and early warning systems. More than 70 percent of the project would be allocated toward the procurement and installation or rehabilitation of hardware under Component 1, a prerequisite for the successful implementation of Component 2, as well as for future efforts in adaptation and disaster risk reduction.

The project will assess and promote legal arrangements to ensure long-term public commitment to hydro-meteorological monitoring and early-warning systems, as well as the provision of paid-for services for the private sector. This is also expected to contribute to the sustainability of the infrastructures installed and the capacities developed.

The ten projects build on and complement previous initiatives financed under the Least Developed Countries Fund, as well as those carried out by other multilateral, bilateral, and national institutions. In addition, projects financed under the Least Developed Countries Fund continue to include components that contribute toward strengthening the capacity of hydro-meteorological services.

<sup>3</sup> For this regional initiative, ten separate projects were submitted to GEF Secretariat for LDCF funding approval.



## Climate proofing local development gains in rural and urban areas of Machinga and Mangochi Districts

### Country Background and Targeted Vulnerabilities

Malawi's high dependency on rainfed maize agriculture, combined with poor urban planning in rural towns makes 85 percent of its population highly vulnerable to climate change-induced droughts, floods, and post-harvest grain losses. A recent evaluation of the impacts of the natural hazards using probabilistic risk analysis reported that Malawi lost on average 4.6 percent of the maize production (nationally) each year because of droughts, and 12 percent to flooding in the southern region. Climate change further exacerbates food insecurity through increased post-harvest losses of grain.

Nonfarm and urban households are also vulnerable, especially the poor who spend a large proportion of their income on food, and occupy regions vulnerable to floods. Urban areas (and people living in them) experience additional problems from floods, resulting from unplanned urban growth, the occupation of flood plains, and poor solid waste and storm water drainage management, often dumping of solid waste into river and storm water systems.

### Project Activities and Expected Impacts

The main goal of the project is to reduce vulnerability to climate-induced droughts, floods and post-harvest grain losses for rural and urban communities of Mangochi and Machinga Districts by using ecological, physical, and policy measures. Ecological and physical infrastructure measures for water management will be adopted to reduce risk of climate change driven floods while mitigating droughts. In addition, climate-safe post-harvest management technologies and practices will reduce

grain loss and increase food security. Replication and sustainability of these initiatives will be secured through mainstreaming climate change considerations and financing into local development programs and a capacitated extension service.

The project will undertake two main components: i) ecological and physical works demonstrated as climate smart measures for water, soil, fertility, and post-harvest management practices that reduce climate change induced risks to the productivity gains of the agricultural input subsidy program; and ii) upscaling results from public and domestic water management measures (undertaken by Outcome 1) used to transform local and national implementation of the baseline programs, and upscaling the resilience of agricultural productivity gains and decentralized development processes.

Main adaptation benefits include improved water and soil fertility, increase in base flow, reduction of flooding, and increase in resilience of agriculture to the effects of expected increased frequency of drought. Public and domestic water harvesting, storage, and distribution will be improved, as well as irrigation baselines.

The baseline to this project consists of several programs related to decentralization of governance and administration systems, subsidized agricultural input for increased food security, flood risk management, irrigation, and conservation agriculture, all delivered through the regional extension service; and with a combined value of over \$130 million of government and development partners' investments. The proposed project will improve the effectiveness of the baseline programs by securing the productivity gains in spite of climate change driven risks, primarily in two districts that cover an area of over a million hectares with a total population of about one million people.



## Solomon Islands Water Sector Adaptation Project (SIWSAP)

### Country Background and Vulnerabilities

The report: Solomon Islands Water, Sanitation, and Climate Outlook describes the poor state of affairs regarding water resource management in the country. According to the report, water and sanitation are in a state of neglect with significant gaps in governance and institutional arrangements and very limited human and financial capacity. The impacts of climate change, particularly sea-level rise and pronounced droughts have severe consequences on water and sanitation in the country. The areas that are most vulnerable to sea-level rise are low-lying islands, atolls, and flat deltaic regions at the mouth of larger rivers. Intrusion of salt water from rise in sea level has affected groundwater resources, especially freshwater aquifers (lens) in small atolls and low-lying islands that rely on rainfall or groundwater for their freshwater supply. Droughts have severely affected water supplies; the 1997-98 droughts resulted in reduction of freshwater available in Honiara by around 30 to 40 percent. Droughts have also damaged crops and livelihoods.

The climate-induced impacts on the water sector in the Solomon Islands would have economy-wide implications considering the closer links between human development and water and sanitation than any other variable, including health, education, gender equality, and access to modern energy services.

### Project Activities and Expected Impacts

This project aims to improve the resilience of water resources to the impacts of climate change in order to improve health, sanitation, and quality of life, and sustain livelihoods in targeted vulnerable areas. It will do so by undertaking three components:

- Water sector climate change adaptation planning in the context of integrated water resources management
- Implementation of water sector climate change adaptation
- Climate change adaptation-oriented governance in the water sector

The project will implement the NAPA priorities in the water sector in a transformational manner. This will be done through the explicit integration of climate change considerations in significant ongoing and planned water sector projects that are primarily developmental in nature adopting the business-as-usual approach with no climate adaptation components currently included. At the center of this project is the baseline project “Rural Water and Sanitation Improvement Initiative.” For sector-specific policies, this proposed project will build on the relevant works of the WatSan projects funded by AusAID and EU.

Expected activities include both soft adaptation measures as well as investments in water and sanitation infrastructure, including the following: enhanced household and communal water storage systems and infrastructure; design and construction of applicable small-scale climate-resilient reservoir in at least one site; provision of up to four portable water filtration or desalination systems for sharing across communities in times of extreme water scarcity; protection of freshwater lens through better sanitation practices in small islands; protection and restoration of ecosystems that protect critical water resources; community-based monitoring of water supply and demand; improvements in water-use efficiency and overall demand management; use of innovative instruments for supply and demand-side management; and capacity building on water and sanitation management.



## Enhancing the resilience of tourism-reliant communities to climate change risks

### Country Background and Targeted Vulnerabilities

Tourism is a vital economic force in Samoa representing around 30 percent of GDP and providing livelihood to many local businesses in the accommodation, catering, and transportation subsectors. It also provides broader income opportunities through its knock off effects in the tourism value chain, such as handicrafts, agricultural production, and communication services.

Climate change can affect tourism destinations through both direct climatic impacts and indirect environmental and socioeconomic change impacts. Tourism operators and associated communities in Samoa are very heavily dependent on the country's natural resource base. Samoa's prime tourist attractions are its tropical climate and pristine beaches, its tropical coastal and inland ecosystems, and landscapes. The traditional culture is very closely attached to the use of land-based, coastal, and marine environmental resources. Changing climate variability has been altering the accustomed drier and wetter tropical seasons, with more erratic and unpredictable weather patterns, affecting the planning of tourism seasons and the management of recreational activities.

### Project Activities and Expected Impacts

The project targets communities operating small-scale and traditional beach accommodations and recreational areas, which represent the bulk of tourism facilities outside of the urban area of Apia. The project components are designed to address climate change and disaster risks through an integrated approach, combining policy and institutional strengthening to support an enabling environment for public-private partnerships, engagement of local communities through site-specific risk assessments and adaptation planning,

and implementation of on-the-ground adaptation measures in key community-based tourism areas and operations, as well as South-South exchange and knowledge management processes. These components are the following:

- Institutional strengthening to support climate-resilient tourism policy frameworks. The project's resources will be used to further strengthen the effectiveness of policy instruments and related institutional and technical capacities within the process of mainstreaming climate and disaster risks into the Samoa Tourism Development Plan. The policy, institutional support, and capacity development processes are targeted to create an enabling environment for public-private partnerships as a means of facilitating the introduction and implementation of on-the-ground adaptation measures in selected Tourism Development Areas and community-owned beach tourism operations.
- Implementation of climate change adaptation measures in nationally demarcated Tourism Development Areas. Such measures include the following: climate-proofing community managed tourism infrastructure; climate resilient water management technologies and practices in community managed tourism facilities; shoreline protection measures; and recreational activity diversification as an adaptation response to changes in patterns of climate variability.

Baseline projects for this project include the past NAPA implementation projects: the World Bank funded Pilot Program on Climate Resilience (PPCR); the Adaptation Fund project Enhancing Resilience of Coastal Communities of Samoa to Climate Change and Disaster Risk; and UNDP-supported Community-Centered Sustainable Development Programme, Tsunami Early Recovery Project and Tourism Tsunami Rebuilding Programme, among others.



## Enhancing adaptive capacity and resilience to climate change in the agriculture sector in Comoros

### Country Background and Targeted Vulnerabilities

The agricultural sector is the foundation of the Comorian economy. It contributes nearly 44.7 percent to gross domestic product and export crops generate over 90 percent of export earnings. Export crops include vanilla which represents 6 percent of the world market, ylang-ylang (70 to 80 percent of world demand) and cloves. Food crops account for about 47 percent of the added value of the agricultural sector (including livestock). Agriculture, particularly ylang-ylang, cloves and vanilla, employs 80 percent of the workforce. Despite the crucial role of agriculture in the economy and for employment, the domestic agricultural sector is struggling to provide the food needs of the population. Local food production in the Comoros covers only 49 percent of consumed food.

The weak agricultural baseline is exacerbated by climate related stresses. According to Comoros's NAPA, increases in average annual temperature and erratic rainfall has increased aridity and loss of vegetation cover, leading to soil erosion, development of retreat cracks, and landslides. These factors contributed towards increased degradation of more than 65,000 ha. of land, approximately 57.5 percent of total agricultural land. Agriculture remains strictly rainfed and is significantly impacted by climate induced hazards.

### Project Activities and Expected Impacts

The project's objective is to strengthen the capacities of vulnerable communities to cope with the additional risks posed by climate change and variability on agro-sylvo-pastoral systems. To do this, the project will work to achieve the following components and outcomes:

- Strengthening the adaptive capacity of the agricultural sector institutions. The main outcome of this component is strengthened adaptive capacities of actors involved in the agricultural sector to enable them to plan for and respond to climate risks for agriculture.
- Production and dissemination of agro-meteorological information for decision making in the agriculture sector. Through this component, agro-meteorological and decision support information are packaged into agricultural advisories and disseminated by agricultural extension officers to key stakeholders to promote agricultural resilience to climate change.
- Diffusion of climate resilient agro-sylvo-pastoral technologies in the most vulnerable communities. This component will test and transfer climate resilient strategies to strengthen the climate resilience of agro-sylvo-pastoral systems.

As a result, 370 targeted stakeholders (high-level policy makers, mid-level officers from the ministry of agriculture, the meteorological service, the local authorities, community-based organizations groups, and the farmers' communities) will have developed skills and capacity on how to mainstream climate changes concerns and adaptation options in the key development policies and plans of the agricultural sector. They will have developed skills to design, implement, and monitor climate resilient agriculture measures and strategies. The project will also demonstrate how the management of the Comorian agricultural sector can be adapted to climate change within a prevailing situation of considerable climatic variability. To ensure the sustainability of these capacities, the project will support the documentation and the codification of the knowledge and lessons drawn from the mainstreaming of climate changes and the implementation of agriculture adaptation measures.



## Integrating climate resilience into agricultural and pastoral production for food security in vulnerable rural areas through the farmers field school approach

### Country Background and Targeted Vulnerabilities

It is recognized that Niger's agricultural and pastoral sectors are likely to be severely affected by climate change, along with crop and forage yields. Small farmers and pastoralists are especially vulnerable because of their limited knowledge and capacity to adapt to climate variability and change, and there is a need to build their capacity in adopting drought resilient agro-pastoral and agro-forestry practices to counter the adverse effects of climate variability. The 2009-10 crisis has had severe consequences for the food security and livelihood of small farmers and pastoralists. A situation of severe food insecurity and the longer-term and chronic problem that faces Niger in terms of vulnerability to climate-related natural disasters persist, in spite of the important investments made in the sector in the last decades. These investments did not integrate climate change adaptation concerns or were not specifically designed to aim at them.

### Project Activities and Expected Impacts

This project will address the need for developing proven and cost-effective outreach and extension approaches in order to allow for an effective up-scaling of adaptation strategies and practices that are required to ensure increased climate resilience in Niger's agricultural and agro-pastoral systems and lessen the vulnerability of ongoing and future investments in the agro-pastoral sector. Project interventions will take place in the Sahelian band where most of the more vulnerable communes identified in the NAPA are situated and in the Soudano-Sahelian area, which is critical for national food security. It will focus on at least three

production systems: i) dry cereals, including nonirrigated rice; ii) vegetable-growing practiced mostly by women groups; and iii) mixed crop/livestock systems.

The project is articulated into the following four components: i) piloting of improved climate-resilient agricultural practices in the framework of the National Council on Environment and Sustainable Development mandate, with emphasis on municipalities assisted by the Program of Community Action – Climate Resilience; ii) capacity building and promotion of improved agricultural practices through Farmer Field Schools in the framework of ongoing FAO-supported projects and other partner projects; iii) climate change adaptation strategies mainstreamed into agricultural sector policies and programs; and iv) project monitoring and evaluation.

The project will expand the scope of the activities carried out in the country related to increase resilience of agricultural sector to climatic changes. Intervention measures include the following: piloting of climate resilient improved agricultural practices on crop variation and pastoral diversity; providing tools and training for 20,000 farmers and agro-pastoralists; complementing on-going and planned projects by developing decision making tools for farmers and by developing extension curricula for climate change adaptation; and mainstreaming climate change into agriculture policies and programs.

The project approach is adapted to Niger's inclusion in the World Bank- sponsored Pilot Program for Climate Resilient (PPCR) and its adoption of a national Strategic Program for Climate Resilience. It will contribute to baseline investments: the FAO/ MAE-led process of expansion of a Farmer Field Schools network as a platform for efficient outreach, extension and training at farmer's level, and the EU-sponsored process of structuring a cross-sectors program approach to rural development at national and regional levels.





## Reducing vulnerability of natural resource-dependent livelihoods in Boucles du Mouhoun Forest Corridor and Mare d'Oursi Wetlands Basin

### Country Background and Targeted Vulnerabilities

Generally speaking, the impacts of climate change on agro-ecological system involving wetlands, such as the Mare d'Oursi (MDO) Wetlands Basin, and riverine ecosystems, such as the Boucles du Mouhoun (BdM) Forest Corridor, are complex. Wetlands may decrease in size under warmer conditions or because of changes to inflow. The recharge of lakes and wetlands in the Mare d'Oursi site depend almost exclusively on rainfall and surface and runoff. Ephemeral (vernal) wetlands are particularly vulnerable to climate change. For both sites, hydrological systems are likely to be some of the most affected by climate change. Water scarcity in the sites is likely to be exacerbated because of predicted climatic patterns (decreased surface runoff, increased temperatures and change in rainfall seasonal distribution). The water table in both sites will experience more frequent and sudden drops. Drastic reductions in water at critical times and locations will have a direct and catastrophic impact on livelihoods of communities in the two sites.

Agro-ecological and hydrological systems display a number of climatic vulnerabilities linked to natural and social assets, such as water, pasture, forests, livelihoods, and land use systems. The Boucles du Mouhoun Forest Corridor and in the Mare d'Oursi Wetlands Basin are being managed and utilized to satisfy the most immediate needs of riparian communities. They provide food, fresh water, fiber, and fuel.

### Project Activities and Expected Impacts

This project aims to remove the existing barriers to improving services and functions delivered by ecosystems in Burkina Faso in the face of a changing climate and increased climatic variability. The project responds to a NAPA priority through its specific focus on strengthening natural and social assets that are vulnerable to climate change. The project will deliver this objective through three main components: i) knowledge support platform on climate change impacts and risks; ii) vulnerability reduction and strengthening of resilience demonstrated in the management of natural and social assets in the Boucles du Mouhoun and Mare d'Oursi sites; and iii) climate change adaptation mainstreamed into local and regional development planning and finance.

Through these interventions, Burkina Faso will count on the following: a tailor-made geo-based system specifically for analyzing climate risk and climatic vulnerabilities linked to the management of natural and social systems; capacity of local stakeholders in the project zones to perceive climate risk and to implement and cost adaptation measures in natural resource management activities and livelihoods development will be significantly enhanced; collaboration frameworks and partnerships for adaptation with respect to the Boucles du Mouhoun Forest Corridor and the Mare d'Oursi Wetlands Basin will be consolidated and national capacity for mainstreaming climate change adaptation into sectoral planning and investment frameworks with focus on local and regional levels will be increased.

The following are the baseline for this project: the UNDP-Japan Africa Adaptation Programme; the Danish-funded project Adaptation to Climate Change for the Improvement of Human Security in Burkina Faso; and the Global Climate Change Alliance funded by the EU. The project is executed by the National Council for Environment and Sustainable Development (CONEDD).



## Adapting coastal zone management to climate change in Madagascar considering ecosystem and livelihood improvement

### Country Background and Targeted Vulnerabilities

Madagascar is a 587,041 sq. km. island located 400 km. off the east coast of Africa, with approximately 19 million inhabitants. National economy depends essentially on natural resource based sectors, including agriculture, mineral extraction, tourism, and fishing/aquaculture. The island has more than 5,600 km. of coastline, representing more than a third of the national territory. Important parts of the population, including some urban centers and other economic development activities, are distributed in coastal administrative provinces. In addition, many coastal areas are among the main support of the national economy. Most of the vanilla and coffee plantations, as well as almost the whole fishing/aquaculture industries are found there. These areas are among the most vulnerable part of Madagascar facing climate change, and agricultural production has already begun to decrease in many areas. Climate events, combined with use of rudimentary technology, meant that only 7 percent of the gross national income of Madagascar was obtained by fishing activities in 2003 and the observed reduction of vanilla and rice yields are correlated to climate change impacts on humidity and water resources.

Climate change effects have been translated into increasing floods, droughts, cyclones, soil erosion, crop failure, sedimentation, damage to biodiversity and habitat, forest loss, food shortages, and cholera epidemics. Sea-level rise is likely to have a significant impact on coastal resources, livelihoods, and systems.

### Project Activities and Expected Impacts

This project aims to implement climate change adaptation measures that can protect and enhance human populations and natural ecosystem resilience in coastal regions previously identified in Madagascar's NAPA as the most vulnerable to climate change: Morondava, Mahajanga, and Toamasina. The project will consist of three components: (1) institutional capacity development that address institutional and technical aspects; (2) coastal rehabilitation and management; and (3) mainstreaming adaptation measures into national and sectoral policies, development strategies.

These components are designed to address key gaps in capacity and investment for resilience and adaptation in Madagascar. The largest component invests on ecological services restoration as a means to achieve human resilience and adaptation. In this case, the project in Component 2 will combine infrastructure rehabilitation where necessary with ecological rehabilitation and alternative livelihoods to achieve a balanced and integrated package of protective and productive services in coastal areas.

The approach considers ecological health as a factor of resilience and as a means of strengthening adaptive capacity within communities. The project proposes to use an approach that provides communities with stronger adaptive capacities while ensuring that natural ecosystems are protected. Healthy ecosystems, such as intact forests and wetlands, are beneficial to local populations for the many livelihood benefits that they provide: firewood, clean water, fibers, medicines, shelter, and food. They can also form physical barriers against some extreme weather event (such as storm surges).

This project is executed by the Direction of Climate Change of the Ministry of Environment and Forests.



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