

**PROJECT INFORMATION DOCUMENT (PID)
APPRAISAL STAGE**

Report No.: AB5067

Project Name	Agro-biodiversity and Climate Adaptation
Region	MIDDLE EAST AND NORTH AFRICA
Sector	Crops (60%); General agriculture, fishing and forestry sector (40%)
Project ID	P103922
GEF Focal Area	Climate change
Borrower(s)	GOVERNMENT OF YEMEN
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Environment Category	<input type="checkbox"/> A <input checked="" type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> FI <input type="checkbox"/> TBD (to be determined)
Date PID Prepared	March 02, 2010
Date of Appraisal Authorization	February 13, 2010
Date of Board Approval	May 27, 2010

1. Country and Sector Background

(a) **Rain-fed agriculture is the primary means of livelihood and a safety net for a majority of the rural poor in the highlands.** Yemen is one of the poorest countries in the world with over 40% of the population living in poverty, and a low per capita GDP of US \$930. Although, in general, poverty has declined in the country, rural poverty declined only marginally from 42.8% in 1998 to 40.1% in 2005-06, making it one of the foremost challenges the country continues to face. Agriculture is the largest employer in the country, with nearly 74% of the population engaged in it directly or indirectly. Agriculture development in the past has largely focused on irrigated areas. However, more than half of the country's cultivated area is under rain-fed and subsistence farming conditions. For the nearly 84% of the poor in the rural areas that depend on rain-fed agriculture, it is the primary source of livelihood and food security. The Government of Yemen's Socioeconomic Development Plan for Poverty Reduction (SDPPR 2006-10) identifies increasing the efficiency of rain-fed agriculture as one of its strategies to address rural poverty.

(b) **Rain-fed agriculture is highly vulnerable to the impacts of Climate Change.** According to Yemen's National Adaptation Program of Action [NAPA], and based on IPCC (Intergovernmental Panel for Climate Change) projections, temperatures across the country are

expected to rise anywhere between 1.4 and 2.8 degrees Celsius by 2050. Precipitation and cloud cover patterns are more uncertain, and rainfall variability is likely to be more pronounced, i.e. it is projected to decrease by about 24% or increase by about 35%, depending on the global circulation model used to generate the scenarios. Given the uncertainty presented by current climate models, the precise extent of the vulnerability of rain-fed agriculture is not known and needs to be assessed. However, there is general consensus on increased variability in precipitation, which raises the risk of crop failure and loss of livelihoods in a region where the level of poverty is already high and water is a scarce resource. One study estimates that climate change could lead to a 50% reduction of crop yields for rain-based agricultural crops by 2020.

(c) The agro-biodiversity of the highlands together with the traditional knowledge of farmers has been the cornerstone of communities' ability to adapt to changing climatic conditions in the past. Farmers in this area have for centuries, cultivated in one of the driest and harsh terrains in the world. The agro-ecosystems of this region, however, are rich in agro-biodiversity of several important crops- sorghum, barley and chick pea, are some of the globally important crops with a history of early domestication in this area. Several land races of these crops found today are a result of purposive selection by farmers to meet local soil and climatic conditions. In addition, many wild relatives of these crops and other wild species found in field edges and remnant natural habitats have forage and medicinal value. Traditional methods of water harvesting and storage as well as terrace construction and maintenance have immense value in protecting the agro-ecosystems in the highlands against adverse climatic and environmental events. However, information on these resources is being lost as some farmers migrate to towns and others adopt modern high yielding varieties and increasingly depend on irrigation for farming.

(d) With systematic documentation and testing for climate resilience, these agro-biodiversity resources and the traditional knowledge have the potential to 'climate proof' rain-fed agriculture in the future. The wealth of information which farmers have accumulated over generations regarding the useful attributes of different land races, seed collection and storage, water harvesting and storage, and terrace building techniques has helped in coping with pests, drought, soil erosion and other adverse environmental and climatic events. It is estimated that there are nearly 40,000 land races of sorghum alone, which provides a wide genetic pool for crop improvement programs to meet the challenges of climate change. Several wild relatives of crops and lesser known species have the potential to be tapped as food sources in the future as more regions in the world need food plants that can survive droughts, floods and other climatic extremes. As water continues to become scarce in the highlands traditional water harvesting and terrace building techniques have a vital role in the management of these resources, to cope with the uncertain changes in climate.

(e) However, to build climate resilience there is a need to understand the extent and direction of climate change in the country. Yemen has a complex situation as the country lies in the latitudinal band where global circulation models differ in projected precipitation trends. There is no consensus among the 21 global climate models in the IPCC Fourth Assessment Report about the sign of the projected changes in winter, summer or annual rainfall or its distribution pattern over Yemen. (Wilby2008). The effect of complex topography of the highlands is poorly modeled in current global climate models and there are few, if any, regional climate models that provide detailed scenarios for Yemen. This makes the situation with respect

to rain-fed agriculture particularly difficult as crop choice, cropping pattern and crop management are all rainfall dependent. Information on future climate scenarios is necessary to ensure that coping strategies designed are indeed 'climate resilient'. The main challenge to the development of precise scenarios for Yemen is the paucity of homogenous and continuous time series climate data.

(f) It is essential to develop national capacity in climate data collection and analysis to generate country-specific climate scenarios. Climate data in Yemen are collected and processed by at least three agencies - the Civil Aviation and Meteorology Authority (CAMA), the National Water Resources Authority (NWRA) and the Ministry of Agriculture and Irrigation's Agricultural Research and Extension Authority (AREA). These data are of typically daily resolution with an average record length of around 10 years or less. The lack of long term systematic data makes it difficult to evaluate long term trends in climate variables, especially for extremes. Weather stations for data collection are under different agencies, each collecting data to meet its own mandate. Density of stations is low and data collected from the stations under different agencies are not easily comparable. Data sharing and exchange are usually cumbersome involving bureaucratic procedures. Although the results may not be evident in the short term, it is essential that the building blocks to develop this capacity are put in place now, to ensure that the country has adequate national data to respond effectively to the climate challenge in the coming decades. The proposed project would lay the foundation for development of national capacity in climate modeling and analysis. This capacity generation would benefit from the Pilot Program for Climate Resilience (PPCR) which has been launched in the country¹. The PPCR is an umbrella program that offers the resources and national level coordination to develop this capacity further and scale it up through the planned programs. Some of the representatives in the inter-Ministerial coordinating body for the PPCR would be on the Steering Committee for the proposed project, thus enabling the flow of information and lessons between the two.

(g) Conservation of agro-biodiversity is critical to building climate resilience of the rain-fed agro-ecosystems, as is enhancing national capacity in climate modeling and analysis. The proposed project aims to do both. It recognizes that development of capacity in climate analysis needs sustained long term effort and, therefore, will lay the building blocks for this process which will be scaled up and continued through the programs of the PPCR, which is a long term national initiative.

(h) While capacity for climate analysis is being developed the proposed project will engage communities with 'win-win' or 'no regrets' strategies to enable sustainable management of the natural resources and diversify livelihoods as a safety net. This will be facilitated through the preparation of natural resource management plans and creation of income generating activities which use local agro-biodiversity. Activities financed would include small water harvesting and storage structures and terrace building and maintenance, and income generating activities such as seed multiplication of local land races, revival of local fruit and nut bearing varieties, raising and processing local varieties of medicinal and aromatic herbs.

2. Objectives

¹ The overarching objective of the PPCR is to help highly vulnerable countries pilot and demonstrate ways to integrate climate risk and resilience into core development planning while complementing other ongoing activities.

The Project development objectives are:

- (a) To enhance capacity and awareness at key national agencies and at local levels, to respond to climate variability and change; and,
- (b) To better equip local communities to cope with climate change through the conservation and use of agro-biodiversity

The project will pilot and test the design of improved coping strategies through the use and conservation of agro-biodiversity resources in the rainfed highlands.

Geographical scope and location

Project activities will be located along an agro-ecological gradient in the highlands, with an aim to cover most important areas of rain-fed highlands in terms of agro-biodiversity, a range of altitudes and annual precipitation within the highlands, and overlap with some of the project sites of the RALP and the GSCP. Project activities will be implemented in the Governorates of Al Mahweet [Alrogm and Al Mahweet districts], Sana´a [Blad Alros and Bani Matter districts], Ibb [Yarim and Badan districts] and Taiz [Saber and Alsalo districts]. A Map with project areas is given in Annex 17 of the Project Appraisal Document (PAD).

Site selection was undertaken through purposively selected biophysical agro-ecological gradients to improve sample representativeness. Site selection was done to:

- a. include project sites located along a meso-scale geographic gradient,
- b. cover some of the most important areas of rain-fed highlands
- c. cover a range of altitudes within the highlands
- d. cover a range of mean annual precipitation
- e. cover a range of agro-ecological gradients
- f. overlap with the governorates of ongoing complementary projects to allow for scale-up

Based on the above criteria the following districts have been selected:

Governorate	District	Remarks
Al Mahweet	Alrogm Almahweet	Northern extension of the meso-scale transect; ongoing RALP and GSCP
Sana´a	Blad Alros Bani Matter	Northern central part of the meso-scale transect; ongoing RALP and GSCP
Ibb	Alsadah Badan	Southern central part of the mesoscale transect; high altitudinal gradients; preceding agro-biodiversity projects; GSCP
Taiz	Saber Almoasat	Southern extension of the mesoscale transect; preceding agro-biodiversity projects and GSCP

3. Consistency with CAS objectives. The project directly addresses the current CAS (FY10-13) strategic objective 4, which is to ‘Help manage natural resources scarcity and natural risks’ and CAS thematic area 4.2 – ‘mitigate the impact of natural disasters and invest in climate change adaptation.’ It also contributes to the CAS thematic area 1.4 – ‘support

selected drivers of non-oil growth', in particular, to the identified priority activity of increasing agricultural productivity in rain-fed areas.

4. Rationale for Bank Involvement

(i) ***Long term involvement in the agriculture sector:*** IDA has been supporting the development of the agricultural sector in Yemen for over three decades. Past portfolio included projects in agricultural research and extension and productivity improvement. Recent IDA projects have focused on Groundwater and Soil conservation (FY04) and Irrigation Improvement (FY01) and on rain-fed farming-Rain-fed Agriculture and Livestock Project (FY04). The proposed project continues the support to the agriculture sector, while broadening the focus to meet the challenges posed by climate change. The project is strategically aligned with both the GSCP and the RALP (see Annex 2). With the GSCP the proposed project will collaborate to encourage water harvesting and increasing irrigation efficiency as part of a climate resilient "win-win strategy". The proposed project will collaborate through its activities under Component 1 which are complementary to Component 1 of RALP, to include climate considerations in the identification and improvement of local land races of cereals and lentils (Component 1 of RALP).

(j) ***Bank as the convener of the CIF and PPCR.*** As the convener of the Climate Investment Funds and the Pilot Program on Climate Resilience (PPCR) the Bank provides intellectual leadership on the issue of building climate resilience and 'climate proofing' development in some of the least developed countries. This project is one of the first pilot operations to address adaptation on the ground, in a country selected for the PPCR program. As such, it will benefit from the Bank's wider role in the climate change dialogue with Yemen and at the same time demonstrate adaptation for scaling up through the PPCR.

(k) ***Synergies with country level AAA on climate change*** – the World Bank has a number of ongoing AAA on climate change in Yemen (Annex 2) which the proposed project complements and benefits from. The ACAP draws from the DFID funded 'Real Options Methodology' which will estimate the costs and benefits of the adaptation to climate change; in addition, the project benefits from an ongoing BNPP funded study to develop Climate Change scenarios, and another on Climate Impacts on Water Resource Management in Agriculture. In addition, there are two other pieces of ongoing economic sector work (ESW) which are directly relevant to the objectives of the project: 'Costing Adaptation through Local Institutions' which will use this project as a case study, and the 'Rural Community Resilience to Climate Change'. The project will also complement analytical work that will be undertaken through the PPCR.

5. Description

The Project will have the following four components: Component 1 will build on the traditional knowledge of farmers and develop an inventory of local agro-biodiversity, and identify and test selected land races for climate resilience. Information on the agro-biodiversity resources will be used to develop natural resource management and alternative income generation plans with the communities as part of a 'no regrets' approach to building climate resilience in the highlands. Component 2 will focus on raising awareness on climatic changes and developing initial local predictive capacity of weather patterns and long term climate change scenarios for the country. Component 3 will focus on integrating climate resilience into rain-fed agriculture. At the national

level this will be done through capacity development of the MAI and development of a climate resilient rain-fed agriculture strategy and at the local level through the development and piloting of a menu of coping strategies in partnership with the communities. Component 4 will focus on project management, coordination and monitoring and evaluation. The detailed project description is provided in Annex 4 of the Project Appraisal Document.

Component 1: Agro-biodiversity and local knowledge Utilization and Assessment [GEF: US\$366,500]

Objective: To prepare inventories of land races and other agro-biodiversity and develop vulnerability profiles of selected land races

Outcome: Information to enhance and develop agro-biodiversity based coping strategies in place.

Activities financed under this component would include: (a) preparation of inventories of local agro-biodiversity and knowledge from farmers on adaptive characteristics of local landraces and wild relatives of crop species; (b) development of Climate resilience profiles of selected landraces, after testing and piloting for resilience to impacts of climate change; and, (c) preparation of a feasibility report for micro-enterprises using this agro-biodiversity. This will indicate the potential for alternative income generation through sustainable use of agro-biodiversity in the area.

Sub-components

1.1 Agro-biodiversity Inventories

1.2 Development of vulnerability profiles of selected Land Races

1.3 Micro enterprises assessment report on agro-biodiversity utilization

Component 2: Climate Change Modeling and Capacity Building [GEF: US\$600,000]

Objective: To lay the foundation for development of national capacity in climate modeling and data analysis

Outcome: Enhanced capacity of national institutions to develop climate scenarios based on regional climate models

This component will finance activities which will be the *building blocks* for developing capacity in climate change analysis and modeling. More specifically, the ACAP will finance (1) development of an improved climate database, including upgrading of select weather monitoring stations; (2) ‘downscaling’ global climate models for relevance and use in-country; (3) development of technical capacity, specifically in relation to climate information management and modeling; and (4) sharing climate information inputs and outputs with other agencies and users.

Sub-components

2.1 Development of Improved Climate Database

2.2 Downscaling Climate Models

2.3 Training and Technical Capacity Development

2.4 Sharing Climate Information Inputs and Outputs

Component 3: Integrating Climate Change into Rain-fed Agriculture [GEF: US\$2,801,300]

Objective: To develop a strategic approach to integrate climate change into rain-fed agriculture

Outcome: Pilot coping strategies implemented; policies and investment plans of rain-fed agriculture reflect climate considerations

This component will have three sub-components. The first sub-component will finance capacity building activities at for the MAI and the communities. Technical capacity of MAI staff will be developed to take climate change into account when designing rain-fed agriculture programs. At the community level training programs for awareness raising on climate change issues would be financed.

The second sub-component will finance piloting of Coping mechanisms with communities, for better management of natural resources and for diversifying income generation activities. Under the former would be activities such as small scale upgrading of water harvesting and storage structures, terrace rehabilitation and flood protection structures. As part of the latter, income generation activities that use local agro-biodiversity, will be financed.

Under the third sub-component, a detailed assessment of the vulnerability of rain-fed agriculture to climate change will be financed. This will be followed by consultations with stakeholders to develop a climate resilient rain-fed agriculture strategy which the MAI would adopt.

Sub-components

3.1 Raising awareness and capacity building at national and local levels on climate change

3.2 Piloting coping strategies at local landscape units

3.3 Preparation of a Climate Resilient Agriculture Strategy for Rain-fed highlands

Component 4: Project Coordination and Management [GEF: US\$232,200]

Objective: To enable effective coordination and management of the project

Outcome: Effective project management, monitoring and improved Coordination

Project implementation will be overseen by the GSCP PCU. The PCU is headed by a Project Director and has staff to oversee procurement, financial management and administrative support functions. On the technical side the team will include a specialist in climate change and natural resources management and monitoring and evaluation.

A monitoring system will be put in place that tracks performance of the PCU in relation to (a) progress in achieving scheduled activities and outputs and against each component; (b) expenditure against budget allocations; (c) project impact on key outcomes and indicators of achievement; and (d) environmental and social management plan. Indicators and monitoring mechanisms are detailed in Annex 3 of the Project Appraisal Document.

6. Financing

Source:	(\$m.)
BORROWER/RECIPIENT	0
Global Environment Facility (GEF)	4
Total	4

7. Implementation

A wide range of stakeholders will be involved in the project, many of whom have already helped to shape the project design. They will participate during implementation in different ways: as contributing technical agencies and partners in line with their institutional mandates. Community cooperatives and Water User Associations (WUA) will also be directly involved in the project delivery.

The project will be implemented over 4 years, with primary coordination provided by the Ministry of Agriculture and Irrigation, and day to day implementation by the Project Coordination Unit currently implementing the GSCP. The PCU will comprise of the Project Director, supported by a core staff including procurement and financial management. In addition, there would be an expert with international experience to deal with climate change and natural resource management issues and another to deal with M&E. The PCU will be supported in implementation by its Field Units (FUs) in Sana'a (supporting Al Mahweet) and Taiz (supporting the work in Ibb). The FUs have experience in implementing terrace construction, water harvesting and storage structures, spate irrigation and wadi bank protection, in addition to working with the Water Users Associations.

Overall strategic and policy guidance will be provided by the Project Steering Committee (PSC) chaired by the Minister for Agriculture and Irrigation (MAI) with membership from the following Ministries and agencies: MOPIC, MAI, MOF, CAMA, AREA, EPA, NWRA and the PCU. A Technical Coordination Committee (TCC) chaired by the Deputy Minister for Irrigation and Land Reclamation, MAI, will provide strategic guidance to the PSC. The TCC which will function as an ad-hoc committee will be convened for the review and exchange of information and knowledge products, and include AREA, CAMA, NWRA, PCU and others as needed.

8. Sustainability and Replicability

Institutional sustainability: This pilot project comes at a timely moment. The Government has just set up a National Climate Coordination committee under the chairmanship of the Deputy Prime Minister. All key agencies and ministries are represented on this committee that is to assist Yemen to mainstream climate change into the national development planning processes and into the work of the line ministries and agencies. The project will benefit directly from this process where the Ministry of Agriculture is a key member, and in turn the EPA who is the Technical Secretariat of the National Climate Coordination Committee will provide the link between the lessons and results of this project to the national process. This pilot project will also directly inform and in turn benefit from the Pilot Program for Climate Resilience. The design of the

project has sought to ensure that the project benefits and outcomes will be institutionally sustained beyond the end of the project.

Technical sustainability: Components 1 and 2 which deal with agro-biodiversity and climate aspects respectively, will work through the relevant agencies (e.g. AREA, CAMA, EPA, GSMC) to enhance technical capacities and capabilities both for the implementation of the various components, and to enable mainstreaming climate issues into their institutional agendas. Specifically, the arrangement will allow for data, information and results generated to be utilized and sustained. The Technical Coordination Committee of the project will specifically allow for the continued exchange of ideas, experiences and lessons which will enhance the core technical capabilities of these institutions.

Replicability and scale-up. Any scale-up of the climate modeling work and uptake of the piloted coping strategies to the other rain-fed highlands; or as general principles or reforms for the broader agricultural agenda will have to be promoted – largely through component 3 – both at the project and program levels. This project will seek to initiate the scale-up largely through the GSCP and RALP which extend over a wide range of governorates in rain-fed areas. The policy work through the development of a national agriculture strategy for rain-fed highlands will also seek to ensure that climate is mainstreamed in all future plans, and programs.

9. Safeguard Policies (including public consultation)

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[X]	[]
Natural Habitats (OP/BP 4.04)	[]	[X]
Pest Management (OP 4.09)	[X]	[]
Physical Cultural Resources (OP/BP 4.11)	[]	[X]
Involuntary Resettlement (OP/BP 4.12)	[]	[X]
Indigenous Peoples (OP/BP 4.10)	[]	[X]
Forests (OP/BP 4.36)	[]	[X]
Safety of Dams (OP/BP 4.37)	[]	[X]
Projects in Disputed Areas (OP/BP 7.60)*	[]	[X]
Projects on International Waterways (OP/BP 7.50)	[]	[X]

The project is classified as environmental category B and designed to ensure compliance with the requirements of the following safeguard policies that are triggered: Environmental Assessment (OP 4.01) and Pest Management (OP 4.09). An environmental and social impact assessment was undertaken which underscored the largely positive environmental and social impacts that will be generated through the project. An Environmental and Social Management Plan (ESMP) has also been prepared. The ESIA also includes a brief Integrated Pest Management Plan (IPM). The policy has been triggered for precautionary purposes. The policy on Physical Cultural Resources (OP 4.11) will not be triggered by project activities. However, as a precautionary measure the sub-projects will be required to screen for physical cultural resources and chance-finds, and

* By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas

procedures for this have been included in the ESMP. No other safeguard policies are triggered as a result of project activities.

As per the World Bank Disclosure Policy, the executive summary of the ESIA has been translated into Arabic and both the summary and the full report have been disclosed at the Bank Infoshop and in-country in easily accessible places to the public (including PCU field units in the governorates), and the Ministry of Agriculture and Irrigation website.

10. Contact point

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