Climate Investment Funds

PPCR/SC.9/7
October 24, 2011

Meeting of the PPCR Sub-Committee
Washington, DC
November 2, 2011

Agenda Item 7

STRATEGIC PROGRAM FOR CLIMATE RESILIENCE FOR YEMEN

Proposed Decision by PPCR Sub-Committee

The PPCR Sub-Committee, having reviewed the *Strategic Program for Climate Resilience for Yemen* (document PPCR/SC.9/7),

a) endorses the SPCR as a basis for the further development of the projects foreseen in the strategic plan and takes note of the requested funding of USD 50 million in grant funding and USD 60 million in other concessional resources.

b) reconfirms its decisions on the allocation of resources, adopted at its meetings in June 2010 and 2011, that a range of funding for the country should be used as a planning tool in the further development of project and program proposals to be submitted to the PPCR Sub-Committee for PPCR funding approval, recognizing that the minimum amount of the range is more likely and that the upper limit of the range will depend on availability of funding. The range of funding agreed for a single country pilot program is USD 40-50 million in grant resources, and up to USD 36 million in other concessional resources.

c) [recalls its decision on document PPCR/SC.9/4, *MDB Policies and Tools Regarding Debt Sustainability and their Application in the PPCR,* which provides that countries assessed as being at high [or moderate] risk of debt distress should not access PPCR credits for public sector projects. All countries may utilize PPCR credits for private sector investments. Since Yemen has been assessed as a country in high debt distress, the Sub-Committee requests the Government of Yemen to implement its SPCR consistent with this decision.]

d) recognizes that the quality of the proposed activities will be a significant factor in the funding to be approved by the Sub-Committee when project and program proposals are submitted for approval of PPCR funding. The Sub-Committee reconfirms its call for contributors and other countries, the World Bank and other development partners to seek to mobilize additional resources to allow the full funding of the SPCR.

e) requests the Government of Yemen and the World Bank to take into account, in the further development of projects and programs to be financed by the PPCR, written comments submitted by Sub-Committee members by November 15, 2011.

YEMEN

Strategic Program for Climate Resilience

Prepared under the Pilot Program for Climate Resilience

CURRENCY EQUIVALENTS

(Exchange Rate Effective - September 18, 2011)

Currency Unit = Yemeni Rials (YER)

US$ 1.00 = YER 217.87

Abbreviations and Acronyms

AFPPF	Agriculture and Fisheries Production and Promotion Fund
AREA	Agricultural Research and Extension Authority
BCM	Billions of cubic meters
CAMA	Civil Aviation and Meteorological Authority
CWMP	Community Water Management Project
DCG	Donor core group
EPA	Environment Protection Authority
ET	Evapotranspiration
GCM	Global climate model
GSCP	Groundwater and Soil Conservation Project
IDA	International Development Association of the World Bank
IIP	Irrigation Improvement Project
IPCC	International Panel on Climate Change
ITCZ	Inter Tropical Convergence Zone
IMCCC	Inter-Ministerial Council on Climatic Change
IWRM	Integrated water resource management
MAI	Ministry of Agriculture and Irrigation
MCM	Millions of cubic meters
MOPIC	Ministry of Planning and International Cooperation
MWE	Ministry of Water and Environment
NAPA	National Adaptation Program of Action
NWRA	National Water Resources Authority
NWSSIP	National Water Sector Strategy and Investment Program
PPCR	Pilot Program for Climate Resilience
RALP	Rainfed Agriculture and Livestock Project
SBWMP	Sana'a Basin Water Management Project
TDA	Tehama Development Authority
WSSP	Water Sector Support Program
WUA	Water User Association

FISCAL YEAR

January 1 – December 31

Summary of SPCR Program

PILOT PROGRAM FOR CLIMATE RESILIENCE **Summary of Strategic Program for Climate Resilience**		
1. **Country/Region**:	Republic of Yemen	
2. **PPCR Funding Request (in USD million)**[1]**:**	*Loan:60.00*	*Grant:50.00*
3. **National PPCR Focal Point**:	*Mr. Mahmoud Shidiwah, Chairman, Environment Protection Authority*	
4. **National Implementing Agency** (Coordination of Investment Strategy)**:**	*Environment Protection Authority (EPA)*	
5. **Involved MDB**	*World Bank (IBRD), International Finance Cooperation (IFC)*	
6. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	*Headquarters-PPCR Focal Point:* *Kanta Kumari Rigaud (World Bank)*	*Program Task Team Leader* *Lia Sieghart (World Bank)*

7. **Description of SPCR as a strategic framework outline:**

(a) Key challenges related to vulnerability to climate change/variability:

- **Increased water scarcity and reduced water quality** – leading to increased hardship on rural livelihoods;
- **Increased drought frequency, increased temperatures, and changes in precipitation patterns, as well as increased number of flash floods** – leading to degradation of agricultural lands, soils and terraces;
- **Deterioration of habitats and biodiversity** – leading to expansion of desertification;
- **Reduced agricultural productivity** – leading to increased food insecurity and reduced income generating activities;
- **Increased sea levels** – leading to deterioration of wetlands, coastal mangrove migration, erosion, infrastructure damage, and seawater groundwater intrusion;
- **Increased climatic variability** – leading to the possibility of spread and growth of vector borne and water borne diseases; and
- **Impacts on coastal zones** – leading to a loss of tourism activity due to sea level rise, including loss of beaches.
- **Absence of long-term climatic data** – rendering planning and prediction problematic.

(b) Areas of Intervention – sectors and themes

Sectors and themes for intervention:

- **Water:** Policy work and institution strengthening, participatory watershed management, resource protection, flood control

[1] Includes preparation grant and project/program amount. Funds will not be transferred at Sub-Committee endorsement.

- **Agriculture:** Rain-fed agriculture, rural livelihoods, water and soil conservation, knowledge management
- **Coastal Zones:** Direct adaptation measures, knowledge management, mainstreaming of climate resilience
- **Cross-sectoral:** Climate information systems and services, program coordination

(c) Expected Outcomes from the Implementation of the SPCR

- Building climatic resilience and ability adaptation into the water and agricultural sectors, as well as the coastal zones that are considered to be the three areas most at risk
- Improve food security by improving resilience of both water and agriculture sectors
- Augment current agricultural production planning that does not take into account future climate change
- Improve sustainability of irrigated agriculture by bringing a resolution to the problem of groundwater regulation

8. **Expected Key results from the Implementation of the Investment Strategy (consistent with PPCR Results Framework):**

Result	**Success Indicator(s)**
Investment I: Climate Information System and PPCR Program	
• Production of reliable data and information. • Early warning systems functional in three areas identified as vulnerable to disasters. • Information and data are used for planning and implementation of future programs and projects	• Quantity and type of acquired equipment • Number of hydro-meteorological stations in conformity with international norms • Increase in number of hydro-meteorological stations • Number of MOUs signed with entities for data access
• Increased capacity of practitioners to data leading to informed decision making • Routine general and targeted delivery of weather forecasts to end users to clients.	• Number of end-users using meteorological information and products • Number of evacuation/rescue drills in select vulnerable locations after early warning systems are established. • Number of weather forecasts published in national newspapers; aired on radio and television.
• IMCCC is regularly updated on SPCR implementation • Relevant information concerning PPCR activities is shared at national and international levels • Single entry point for PPCR program is provided • Increased capacity of female	• Number of information sharing activities on program initiatives • Proportion of approved annual work plans implemented • Number of capacity-building activities for gender sensitive approaches • Proportion of approved annual work plans

practitioners	implemented
Investment II: Improving the Climate Resilience of the Water Sector	
• Improve the capacity of central and local institutions in managing the water sector in light of increasing risk of climate change on already difficult situation of water scarcity in several vulnerable communities and economic activities	• Increase the number of local water groups and institutions participating in actions designed to better manage the water sector.
• Periodical reports on risk analysis and procedures to update warning system related to drought, floods, and mitigation of climate change • Improve capacity of local institutions and participating agencies in collecting and updating weather information related to water and impact on economic activities. • Increased capacity of local practitioners to generate localized, downscaled climate change models, and established linkages with the future climate information	• Number of offices established • Quality of reports produced • Utilization of reports in shaping policies and regulations and actions. • Public awareness of water resource management issues increases
• Programs initiated in the water sector include climate resiliency measures in their design	• Communities have effective system of incentives for sound IWRM, • Continuous public education becomes part of WUA and NWRA mandate
• Improved water structure to manage floods and recharge ground water, improve water supplies to local communities, and reduce runoff and protect soil and crops • WUAs have increased their capacity and can conduct effective local monitoring and law enforcement • Communities take primary responsibility for integrated management of their own water resources	• Number of pilot flood control structures requested by participating communities • Contribution of local communities to better management of floods and watersheds • Number of famers who adopt modern irrigation technology • Quality improvement in irrigation services and in increasing productivity among farmers in participating communities.

• Development practices become more climate resilient nationwide through better integration of climate resiliency measures in national planning • Funding for common risk financing platform is stable and sustainable and continues to attract contributions from existing and new donors	
• Increased use of recycled water for agriculture and environmental services • Improve technology for collection, treatment and application	• Volume of added water supplies for agriculture • Increased participation of communities in collection and use
Investment III: Improving Rural Livelihood through Adaptation in Rain-fed Agriculture (IRLARA)	
• Innovative soil and water conservation practices improve agricultural productivity and reduce the impact of climate risks	• Number of Comprehensive Watershed Management Plans
• Innovative investment channels improve the livelihoods of local populations and reduce the impact of climate risks	• Number of community sub-projects initiated
• The security of the most vulnerable groups is increased	• % of households benefitting from the social protection measures • Number of communities adopting community based early warning systems
• Appropriate information concerning IRLARA activities is shared at national and international levels	• Number of information sharing activities on project initiatives • % of approved annual work plans implemented
Investment IV: Climate-Resilient Integrated Coastal Zone Management	
• Strengthened institutional capacity to integrate climate-resilient ICZM into decision making at Shabwa, Hodeidah and Aden governorates • Increased awareness to ICZM and climate change.	• % of actions implemented as identified by the institutional framework action plan for each governorate • Availability of zoning, management plans and construction codes for the three sites, integrating climate adaptation considerations • Availability of a prioritized menu of best-practice options of alternative income sources, mechanisms for improved ecosystem services and climate-resilient infrastructure for the three target sites

	• % of communication and awareness raising program implemented
• Increased capacity of local practitioners to generate localized, downscaled climate change models, and established institutional linkages, including with the future National Climate Information System, leading to informed decision making and development planning for the coast.	• Number of practitioners trained to undertake climate modeling
• Demonstration of climate adaptation measures at the three target sites	• Percent of identified alternative income sources implemented • Percent of identified ecosystem services implemented • Percent of identified climate-resilient infrastructure implemented
• Efficient and effective project management and M&E in accordance with the Grant Agreement, Project Implementation Manual, and annual work plans, and in compliance with fiduciary requirements	• An effective M&E system is in place • % of approved annual work plans implemented

9. **Project and Program Concepts under the SPCR:**

Project/Program Concept Title	**MDB**	**Requested PPCR Amount ($)**[2]/[3]	**Grant or Loan**	**Expected co-financing ($)**	**Preparation grant request ($)**	**Total PPCR request**	**MDB Fee ($)**
Investment I: Climate Information System and PPCR Program Coordination	WB	19.0 M	Grant	tbd	500,000	19.0 M	
Investment II: Improving the Climate Resilience of the Water Sector	WB	25.0 M	2.0 grant, 23.0 loan	tbd	500,000	25.0 M	
Investment III: Improving Rural Livelihood through Adaptation in Rain-fed Agriculture	WB	46.0 M	9.0 grant, 37.0 loan	tbd	400,000	46.0 M	
Investment IV: Climate-Resilient Integrated Coastal Zone	WB	20.0 M	Grant	4.5 M GEF, 1.0 M private	400,000	20.0 M	

[2] Includes preparation grant and project/program amount.
[3] Funds would not be transferred at the time of Sub-Committee endorsement.

Management				sector (tbd), in-kind			
TOTAL		110.0 M	50.0 grant, 60.0 loan	5.5 M	1.8 M	110.0 M	

10. **Timeframe** (tentative) – Approval[45] Milestones

INVESTMENT I: Climate Information System and PPCR Program Coordination: tbd
INVESTMENT II: Improving the Climate Resilience of the Water Sector: tbd
INVESTMENT III: Improving Rural Livelihood through Adaptation in Rain-fed Agriculture: tbd
INVESTMENT IV: Climate-Resilient Integrated Coastal Zone Management: tbd

11. **Key national stakeholder Groups involved in SPCR design**[6]:

Civil society and private sector partners:

Civil Society Organizations and other stakeholders such as academic and research institutes, corporations, NGOs, community based organizations, farmers and fishermen unions and societies were engaged and participated actively as important partners and key stakeholders. It is envisaged to continue and increase their involvement in the activities under the PPCR at different stages and also to incorporate their feedback into the design, implementation, and evaluation of the PPCR activities. This participatory process helped build national and local ownership of the PPCR, and enabled participants to reach consensus on the priorities for action by the public and private sectors given the climate risks facing the country. Consultations with donors and development partners that are active in Yemen also helped identify potential synergies and avoided duplication of efforts. These efforts will continue throughout the preparation phase of all proposed investments
Feedback from women's groups, such as Yemeni Women's Union (YWU) and Women Environmental Society, were actively sought whenever feasible throughout the SPCR preparation process.

Government of Yemen partners:

Ministry of Water and Environment (MWE), Ministry of Agriculture and Irrigation (MAI), International Ministry of Planning and International Cooperation (MPIC), Ministry of Finance (MoF), Marine Science and Biological Research Authority within the Ministry of Fish Wealth, Ministry of Education, Ministry of Public Health, National Water Resource Authority (NWRA), Civil Aviation and Meteorological Authority (CAMA).
Despite recent instability in the country, Yemeni counterparts in the EPA continued internal dialogue with government and NGOs, sharing ideas and progress, and thereby benefitting from feedback received. The strong coordination within the country lead by the Deputy Prime Minister in his capacity as the Chair of the IMCCC in cooperation with the Environment Protection Authority (EPA) was helpful in providing the needed input and guidance throughout the process. Subsequently, the Bank team used the opportunity to meet with the Yemeni counterparts in Addis Ababa, Ethiopia, from 10th to 18th March, 2011, to shape the draft SPCR. Since then the Bank has had regular and telephone conferences with local counterparts in Yemen guided by the EPA in Sana'a to update the draft SPCR. This was supplemented by feedback received from key stakeholders through emails and bilateral meetings via teleconference. The EPA was

[4] Expected signature of loan/grant agreement between government and MDB is to be determined.

[6] Other local, national and international partners expected to be involved in design and implementation of the strategy.

leading the key stakeholder consultation process which further supported the development of the SPCR to its present shape.

12. **Other Partners involved in SPCR:**

Consultations included a number of bilateral partners that are active in Yemen: Germany, the Netherlands, France, the UK, the US, Japan, Italy, and multilateral partners like the World Bank, the UN System, FAO, and WHO. Other important partners included the Kuwait Fund, Islamic Development Bank, and the Arab Fund.

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Executive Summary

1. Yemen, one of the least developed countries in the world and one of the poorest in the Middle East and North Africa (MENA) region, faces daunting development challenges in an uncertain global and regional environment. Living conditions for much of Yemen's population of 23 million prove to be difficult. With a GDP per capita of US$1,209, a third of the population lives in poverty and the country ranks 140 out of 182 countries in the 2009 Human Development Index. The achievement of the Millennium Development Goals (MDGs) by 2015 appears to be difficult, with the possible exception of the goal for universal primary education. Currently the country is facing political unrest which may further aggravate the dangerous downward trend for already impoverished Yemenis.

2. Yemen is particularly reliant on its natural resources outside the extractive industries. Agriculture plays a leading role in Yemen's economy and employs more than half of the labor force. It also account for more than 90% of all water use. Unlike most of the world, economic dependence on agriculture is also growing because of reduced growth in the industrial, manufacturing and service sectors since 2000. Even so, half of agricultural land remains rainfed while 40% is reliant of rapidly depleting groundwater resources.

3. Current rates of groundwater use in the highland water basins are twice the rate of recharge and it is predicted that only a third of the currently irrigated area will be sustainable by 2030. Unless measures are taken to improve agricultural productivity while reducing water use, and assisting adaptation to climate change, it is likely that levels of rural poverty, currently nearing 50%, will increase.

4. The mass of the rural poor are where the incidence of poverty is the highest. The 'rich'[7] districts have better natural resources and location, and larger landholdings. Worse agro ecological conditions prevail in poor districts with less access to irrigation, more people per ha of arable land as well as worse access to basic infrastructure and services in poorer districts.[8]

5. Additionally, as rural areas fail to sustain their populations, the migration to the major cities is high. Like Sana'a, Aden and Ta'iz – already among the fastest growing in the world – will compound the difficulties of maintaining adequate service provision. Migration from the highlands is also likely to increase the population pressure on the coastal plain and near-shore environment as these areas will become prime sites for settlement.

6. Access to secure water supplies is getting worse. Yemen is one of only 11 countries whose access to drinking water sources contracted in the decade ending in 2010. The concentration of population in the relatively water-scarce highland basins - especially in Sana'a and Ta'iz - is leading to extreme water constraints in towns and to aggravated competition for water between the urban and rural sectors. In 2000, 65% of the population had access to improved water supplies - by 2008 this had declined to 62%.

7. In addition to significant development challenges, Yemen is particularly vulnerable to climate change. The country is highly water dependent given the relative importance of the rural economy. Erratic and variable rainfall is a dominant feature of Yemen's climate, a situation made worse by high evapotranspiration rates. In addition, climate change will alter internal ecosystem processes and may shift the whole ecosystem structure of which agriculture is a part. Traditional adaptive responses, superseded by modern crops and water-intense irrigation, may have to be reintroduced.

[7] Albeit the terminology 'rich' needs to seen in the context of the quoted publication
[8] World Bank. 2010. Coping Strategies in Rural Yemen and Policy Implications. 51927-YE.

8. Flash-flooding and droughts are frequent hazards. The floods of 2008, for example, claimed the lives of 180 people, displaced 10,000 and caused damage equivalent to 6% of Yemen's GDP. A serious drought occurred during 1962–70 and had lasting social and economic consequences. More recently a severe drought was reported to have caused displacement of thousands of residents in Al Mahwit Governorate, some 113 km northwest of the capital Sana'a, to abandon their mountainous villages and move to cities. Climatic variability in association with sea level raise may increase the potential for coastal flooding. Thus climate change poses risks for all of Yemen, with the poor and vulnerable populations disproportionately affected.

9. The future outlook for climate change is uncertain. Since the 1950s, summer precipitation totals have declined across a swathe of the Sahel, extending into the Yemen Highlands and recent climatic research indicates a weak drying trend of -1% per decade throughout the 20th century. In addition, the Intergovernmental Panel on Climate Change projects higher rates of warming over East Africa and the Arabian Peninsula than the global average. However, local data for Yemen are scarce, particularly for rainfall. This severely hampers efforts to quantify long-term changes in climate and to assess renewable natural resources such as water. In the absence of consistent climate change projections amongst various models and lack of adequate historical climate data, the World Bank in cooperation with the Environment Protection Authority as well as other development partners commissioned a series of climate change studies. These developed climate change scenarios for Yemen, assessed climate change impacts on the agricultural and water sectors, and reviewed climatic data to inform adaptation strategies for agrobiodiversity resources, and outline possible policy and program responses.

10. These studies concluded that without homogeneous rainfall and temperature records, it is difficult to benchmark future climate variability and change, or the associated impacts. As a result predictability of national and local climate is low for Yemen. Although there is agreement that temperatures will certainly rise - the median temperature projection suggests a warming of over 4°C by 2100, there is little agreement on the direction or magnitude of changes in rainfall, other than to confirm the likelihood of increasing unpredictability and of concentration of rainfall in more intense events.

11. Based on current high water consumption for irrigation and water supplies, most modeling results predict that groundwater reserves will be near exhaustion in the next few decades. Thereafter, groundwater extraction would be limited to recharge levels. The model studies also looked at what the likely outcome would be in 2050 if the climate became warmer and wetter in line with the range of predictions from global climate models. If that occurred, then groundwater availability would be about half the present extraction rates. If, on the other hand, the climate becomes hotter and drier then groundwater availability would be about a quarter of the current rates of extraction. Both scenarios indicate that irrigated agriculture would be significantly reduced as first priority for groundwater use would be for potable water supplies. Thus there is likely to be a greater reliance on rainfed agriculture. In addition, there would be far-reaching social and ecological impacts as the overall carrying capacity of Yemen's land would contract and people moved to cities.

12. Given Yemen's vulnerability to climate change and under current prevailing political conditions, it will be critical to ensure that climate resilience takes a prominent role in national development planning. Inaction will only lead to a further marginalizing of a most vulnerable country and its population.

13. The 2009 Yemen National Adaptation Program of Action (NAPA) had identified an extensive list of interventions that would be needed to address immediate and urgent needs. The prioritization of adaptation projects involved two major steps in the Yemen NAPA process. First, a number of evaluation criteria were locally determined through the stakeholder consultation process. Through a scoring, weighting, and ranking process – part of a multicriteria analysis –a discrete set of prioritized adaptation

activities were developed for each ecological zones and for each of the priority sectors. The initial list of 95 interventions was thus narrowed down to 22 options. After considering how they could be integrated into the national planning process, these were then prioritized into four major sectors:

Sectors	NAPA Adaptation Activity
Water	Rainwater harvesting through various techniques including traditional methods. Water conservation through reuse of treated waste water and grey water from mosques, and irrigation saving techniques.
Agriculture	Rehabilitation and maintenance of mountainous terraces. Promotion of research on drought resistant and heat- and salinity-tolerant crops. Development and implementation of sustainable land management strategies to combat desertification and land degradation.
Coastal Zones	Planting and re-planting of mangroves and palms for adaptation to sea level rise. Coastal zones sustainable management of fisheries resources. Development and implementation of Integrated Coastal Zone Management Programs (ICZM).
Cross-Sectoral	Implementation of an awareness raising program on adaptation to the potential impacts of climate change on vulnerable sectors Development and implementation of programs to improve Yemen's preparedness to cope with extreme weather events. Establishment and maintenance of a Climate Change Database.

14. Yemen is one of the 9 single-country pilots under the Pilot Program for Climate Resilience (PPCR), which aims to pilot and demonstrate ways in which climate risk and resilience may be integrated into core development planning and implementation and promote transformational change as needed. The pragmatic approach taken by the PPCR was to build on existing programs and projects and the NAPA recommendations to mainstream climate resilience and promote synergies on the various risks facing Yemen.

15. The PPCR Scoping Mission took place in July 2009. Subsequently, the Environment Protection Authority (EPA) developed the Draft Phase I PPCR proposal in March 2010 after consultations and dialogue with stakeholders. Subsequently, three rounds of intensive consultations on the Draft Phase I proposal took place in May 2010, the first with the line agencies, the second with civil society, local government, academia and media, and the third with 9 multilateral international development agencies and 6 bilateral development partners. Strongly endorsed by stakeholders, the Draft PPCR Phase I proposal was approved by the PPCR Sub-Committee in June 2010.

16. The Strategic Program for Climate Resilience (SPCR) aims to guide the preparation and subsequent implementation of priority investments under Phase II of the PPCR. It was prepared under the guidance of the Inter-Ministerial Committee on Climate Change led by the EPA in cooperation with the World Bank and the International Finance Corporation. Under the PPCR, Yemen plans to mainstream climate resiliency into development planning at the strategic level, along with a 'knowledge response' and introduce adaptation measures to the risks and opportunities posed by climate variability and change. The development objective is to improve institutional capacity at local and national levels to address climate change risks and increase resilience of communities to climate change impacts. To achieve this the focus of the SPCR is on three pillars:

- *An integrated cross-cutting approach to mainstream climate resilience*
- *Knowledge generation and management*

- *Implementing adaptation measures*

17. The SPCR focuses on longer-term interventions aimed at enhancing climate resilience in Yemen. The SPCR cannot address all of the key risks that have been identified, but aims to address the highest priority risks identified during the preparation process and through consultation with vulnerable communities. Four interrelated SPCR investments are proposed, each addressing a key risk related to climate change:

Proposed SPCR Investments	
Investment I: Climate Information System and PPCR Program Coordination	This would support: (a) National network of hydro-meteorological stations; (b) Human and institutional capacity-building; and (c) Weather, water and climate information services for program management and knowledge sharing in agriculture, food security, water management, etc. and d) PPCR Program management.
Investment II: Improving the Climate Resilience of the Water Sector	This would support: (a) Building a strong policy framework and responsive and capable institutions which implement integrated cross-cutting approach to mainstream climate resilience in the water sector; and (b) Implementing adaptation and mitigation measures at the watershed level.
Investment III: Improving Rural Livelihood through Adaptation in Rain-fed Agriculture Project	This would support: (a) Climate resilient soil and water conservation investments; (b) Improving livelihoods through productive rural investments; (c) Integrated community risk management; and (d) Strategic knowledge management and project coordination.
Investment IV: Climate-Resilient Integrated Coastal Zone Management	This would support: (a) Integrated cross-cutting approach to mainstream climate resilience; (b) Knowledge generation and management; and (c) Implementing adaptation measures.

18. The proposed PPCR investments will add value by enhancing knowledge of Yemen's climate, and build climatic resilience and adaptation ability into the water and agricultural sectors, as well as the coastal zones that are considered to be the three areas most at risk. Because of the interconnected nature of these critical sectors of the economy, changes in climatic variables will bring accompanying variations in the biophysical underpinnings of the economy, with corresponding knock-on effects that will ripple outward through the entire society. The interlocking problems of water and agriculture are expected to have serious implications for food security in a country that already imports a significant proportion of its foodstuffs. Focusing attention on strengthening climatic information and analytical institutions will support knowledge generation to serve the growing importance of the rainfed agricultural sector and the ecological system on which it is linked. In doing so, the PPCR will augment current agricultural production planning that does not take into account future climate change.

19.

PART I: Background and Rationale

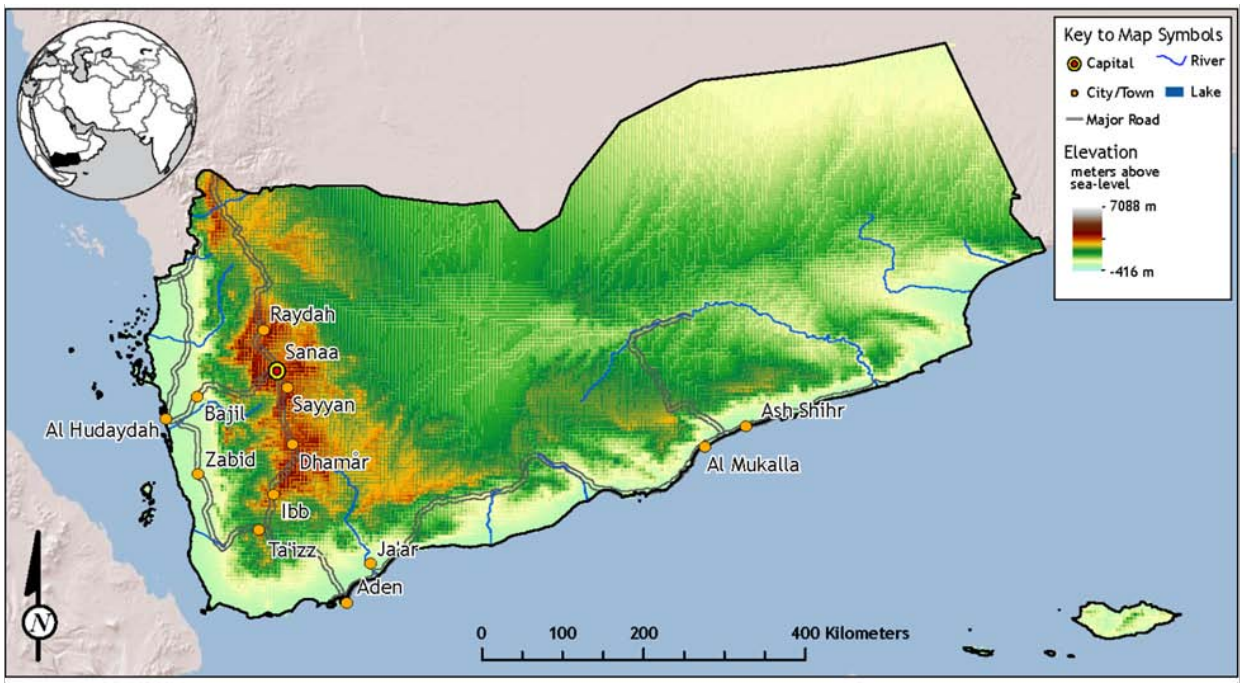
1. Country Circumstances

1. The Republic of Yemen is located in the southwest of the Arabian Peninsula. It is bordered by the Kingdom of Saudi Arabia to the north, the Red Sea to the west, and the Sultanate of Oman to the east. To the south are the Arabian Sea and the Gulf of Aden. Yemen has a land area of 527,970 square kilometers and its territory includes over 200 islands, the largest of which is the Archipelago of Socotra, about 415 km to the south of mainland Yemen.

2. The country can be divided geographically into five main land systems:

1. **Tihama Coastal Plain**, a hot and humid region along the Red Sea and the Gulf of Aden some 30 to 60 km wide;
2. **Yemeni Highlands**, a volcanic region with elevations from 1,000 to 3,600 m, parallel to the coast of the Red Sea, and experiencing monsoon rains;
3. **Yemen High Plateaus and the Hadramawt - Mahra Uplands**, a dissected region with altitudes up to 1,000 m;
4. **Al-Rub Al-Khali** desert interior, with a hot and dry climate; and
5. **Yemeni islands,** including the Socotra Archipelago in the Arabian Sea and more than 112 islands in the Red Sea. Yemen's coastal and marine ecosystems which include extensive mangroves, coral reefs, and sea grass areas are of major economic importance for fisheries and tourism.

Figure 1: Topographical Map of Yemen



Source: GFDRR. (2011). *Yemen: Vulnerability, Risk Reduction, and Adaptation to Climate Change*. Climate risk and adaptation profile. The World Bank: Washington.

3. Yemen, one of the least developed countries in the world and one of the poorest in the Middle East and North Africa (MENA) region, faces daunting development challenges in an uncertain global and regional environment. Living conditions for much of Yemen's population of 23 million prove to be difficult. With a GDP per capita[9] of US$1,209, 34% of the population lives in poverty and the country ranks 140 out of 182 countries in the 2009 Human Development Index. Yemen is also facing rapid population growth (over 3.5% a year), lack of clear alternatives to the oil economy, limited institutional capacity and outreach of the State, rapidly depleting water reserves (with aquifers feeding major cities expected to dry up within the next 15 to 30 years), poor infrastructure, limited human development, including basic education and health service coverage, and acute gender inequality issues. The achievement of the Millennium Development Goals (MDGs) by 2015 appears to be difficult, with the possible exception of the goal for universal primary education.

4. Yemen is confronted with daunting internal and external economic challenges, including conflict. Economic activity is depressed as public expenditures are declining due to a reduction in oil revenues. Petroleum resources are being exhausted. Economic distress is aggravated by the costs from internal conflict since 2004, and a growing water crisis that already ranks amongst the worst in the world.[10] Yemen suffers from serious shortcomings in government capacity, limiting the state's ability to develop and implement policies, take appropriate timely actions, absorb resources, and ultimately deliver services to its citizens.[11] With oil currently accounting for 27 percent of Gross Domestic Product (GDP) and 90 percent of merchandise exports, Yemen's external challenges include: the rapid depletion of oil revenues; fluctuations in oil prices on the world market; the global economic crisis; reduced foreign direct investment (FDI), a reduction in external financing; instability in the Horn of Africa; and an increase in sea piracy that negatively impacts maritime and offshore activities. At the time of writing the country is facing political unrest which may further aggravate the dangerous downward trend for already impoverished Yemenis.

5. Diversifying economic growth by reducing economic dependence on oil is of high priority for the Government of Yemen (GOY). Despite its high contribution to GDP, Yemen's oil sector provides employment for only about 18,000 workers and small enterprises dominate the economy. The rate at which private enterprises are created across the economy is slow, as is the amount of employment generated – only 2.5 new jobs are created per 100 enterprises.[12] Since the adoption of the 2006-2010 Third Five Year Socio-Economic Development Plan for Poverty Reduction (DPPR) and the 2011-2015 Fourth DPPR under development, the GOY has scaled up its efforts to spur non-oil growth.

6. Geographical isolation and accessibility in the largely mountainous and arid country has had a significant impact on the social fabric of the country and its governance structures. The underlying social structure is largely based on a tribal system, where the power of traditional leaders places limits on State authority. Most Yemenis tend to define their identity and affiliations through this tribal system and the sheikhs often play a significant role at the local level. Urbanization and modernization are challenging some of the long-entrenched features of the traditional order, and most non-traditional institutions are relatively weak. Insufficiencies are related to capacity and governance issues, over- or inadequate staffing in the civil service (a legacy of the 1990 reunification when existing civil services were merged without reform), and the persisting need to clarify institutional mandates and structures.

9. At Purchasing Power Parity.
10. Yemen has one of the lowest rates of per capita fresh water availability (135 cubic meters /capita/ year compared to the MNA average of 1,250 cubic meters / capita / year). Water Sector Support Project, World Bank, Jan. 2009.
11."Yemen's Top 10 priorities: A Presentation Organized for Prime Minister Ali Mujawar, Friday July 24, 2009." See also Yemen Social Analysis, World Bank, 2006.
12. Education Sector Study, World Bank (2005).

7. Decentralization and delivering balanced development at the local level are important components of the 4th DPPR (draft). However, decentralization is not yet fully entrenched in Yemen.[13] The 2000 Law of Local Authorities (LAL) kick-started the decentralization process. Local councils were elected at district and governorate levels. Follow-up regulations made functional assignment more specific and indicated how these functions would be financed. The Ministry of Local Administration and some of the central line ministries initiated or continued institutional changes and launched district-level or governorate-level capacity development efforts. The Ministry of Local Administration subsequently established the Decentralization and Local Development Support Program, funded by the United Nations Development Programme (UNDP), to further the aims of decentralization.

8. The Government recognizes the need to increase resiliency against the effects of climate change. Implementation capacity in the country, however, is weak. Mechanisms to deliver focused expenditures through line ministries and local governments are still being developed and fiscal decentralization is yet to be defined. Budget execution remains challenging in Yemen. The capacity of local governments to identify local problems and needs, develop and apply consistent and transparent criteria for resource allocation, formulate climate responsive interventions, and coordinate between sectors is also limited.

9. Since January 2011, there have been urban protest rallies against the government and clashes with police, pro-government supporters and protestors. As an immediate result, central government effectiveness is likely to be reduced due to the political uncertainty. The appointment of several new regional governors may have the same effect in some regions. Outside the capital and regional centers, however, the strength of traditional institutions will likely prove to be an asset that provides the stability essential to continued rural development. This recent political unrest in Yemen will pose some difficulties to the process of building resilience, but should not be sufficient to halt it completely.

13. Ministry of Planning and International Cooperation (2011): 4th DPPR 2011-2015. Annex 10: Increasing Yemen's Absorptive Capacity. April 5, 2011

2. Development Context and Climate Risks

Development Context

10. In addition to significant development challenges, Yemen is particularly vulnerable to climate change because of three main characteristics:

- Institutional weakness undermines the ability of the state to adjust to demographic pressures, a problem made more difficult by the poor economic outlook.
- The country is highly water dependent given the relative importance of the rural economy, yet already experiences a high level of water stress that is exacerbated by the competition between agriculture and rapidly growing urban populations for scarce groundwater resources.
- In addition climate change will alter internal ecosystem processes and may shift the whole ecosystem structure of which agriculture is a part.

11. With the growing frequency and severity of disaster events globally in recent years, it is becoming increasingly difficult for affected countries to cover the economic costs of reconstruction from country budgets.[14] In the case of Yemen, this is even more pertinent: existing fiscal deficits are at risk of being further aggravated as the country faces high risk from natural hazards such as earthquakes, droughts, floods, and land/rockslides which result in significant loss of life, and damages to livelihoods, property and infrastructure. The effects of the October 2008 floods alone were estimated at US$1.6 billion, equivalent to 6% of Yemen's GDP, thus illustrating the sheer magnitude of the disaster. At least one disaster strikes the country every year with estimated annual economic losses averaging $70 million.

Climate

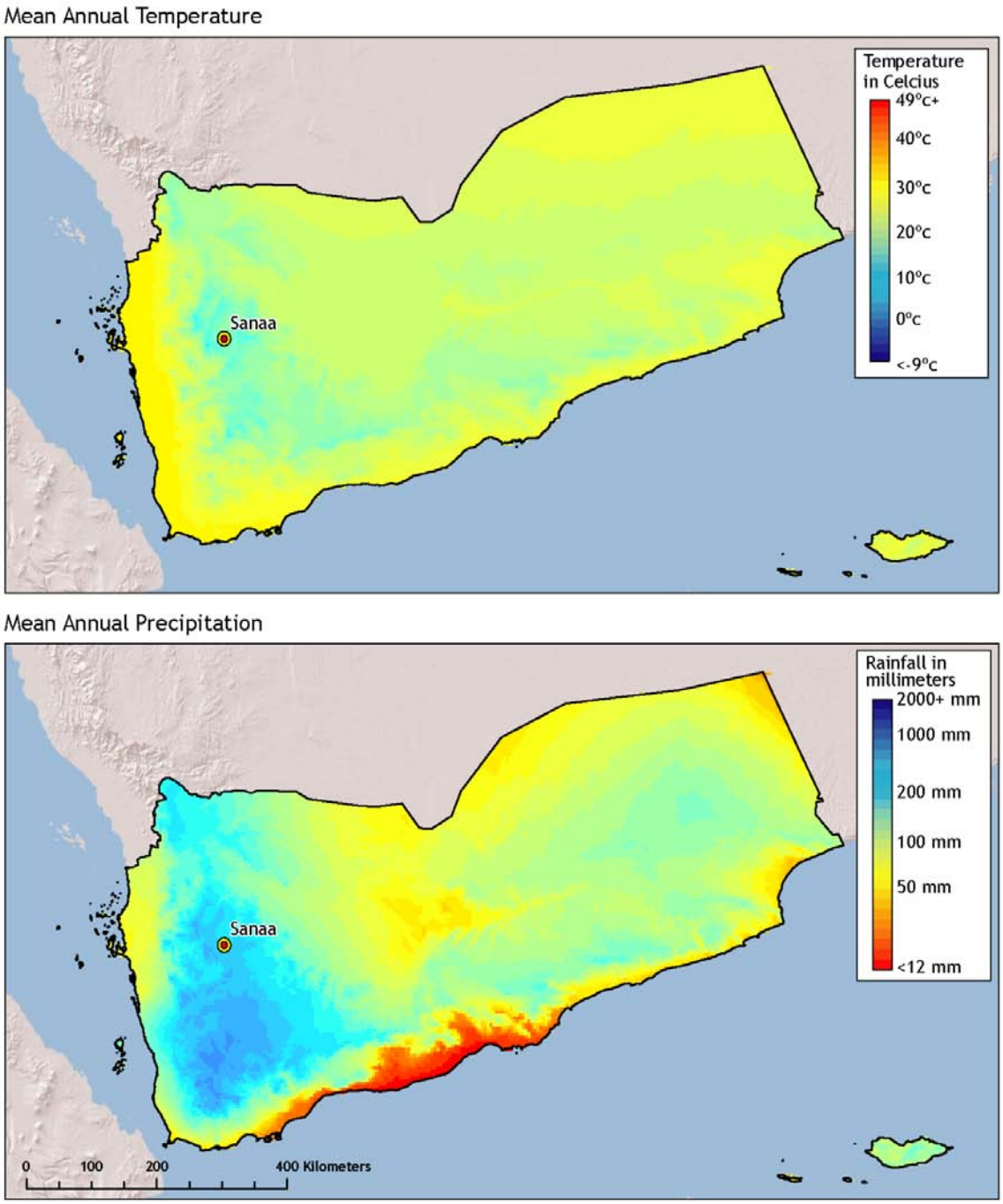
12. Yemen has a diverse and uncertain climate. The extreme differences in elevation are largely responsible for the great variations in temperature and climate over the country. Yemen is characterized by a diverse physical and topographical feature, which is composed of mountain chains, plateaus, plains and wadis.[15] This variation leads to wide differences in climatic conditions and consequently to a formation of different agro-climatic zones.

13. Climatic conditions vary from a hot and dry climate in the coastal plains regions and low mountain slopes, where precipitation ranges from 0 to 400 millimeters and the temperature rises to 40°C in summer to a temperate climate in the highlands where precipitation varies from 200 to 1500 millimeters and winter temperature may fall below 0°C (Figure 2). Between these two extreme climates, there is a transitional arid subtropical climate, with precipitation from 100 to 600 millimeters and mean monthly temperatures from 16°C to 28°C, which prevails in lower and upper mountain slopes and the eastern plateau. Two-thirds of the country is classified as hyper-arid (the deserts and parts of the coastal plain), and most of the rest is classified as arid. The highland areas around Hajjah, Al Mahweet and Ta'iz are classed as semi-arid, and only small pockets near Ibb are rated as sub-humid.

14. In a major regional study on the economic vulnerability of Latin American countries to natural disasters, Friedman (2003) finds that besides the direct costs associated with physical damage, natural disasters typically lead to (i) a worsening of the fiscal position, as governments pay for reconstruction and sources of revenue are disrupted; (ii) a worsening of the trade balance, as the exporting capacity is hampered and imports for reconstruction surge; (iii) downward pressure on the exchange rate due to the worsening of the trade balance and concerns about the repayment capacity of the government by international investors; and (iv) inflationary pressures. Therefore, the total impact on the budget widely exceeds the direct costs of relief and reconstruction from natural disasters.

15. Wadi = A valley, gully, or streambed that remains dry except during the rainy season.

Figure 2: Mean Annual Temperature and Rainfall



Source: Library of Congress – Federal Research Division Country Profile: Yemen, December 2006

14. Most of Yemen is situated in the border zone between two main weather patterns: the regular northerly winds (from the Mediterranean basin) and the south-western monsoon winds. This creates a fairly well-defined seasonal rhythm; the northerly winds predominate during the winter, while in the summer, the south-west monsoon brings the primary rains. Cut off from this pattern by the central mountains, the southern fringe areas in the Gulf of Aden experience a markedly tropical climate. In Al-

Hudaydah and Aden, temperatures often exceed 38° C with high humidity, whereas in the capital Sana'a, the daytime temperature averages around 21° C, with a very low humidity. The higher northern elevations of the central massif experience frequent frosts during the winter months.[16]

15. A dominant characteristic of Yemen's climate is the high variability of rainfall. Precipitation is erratic and variable from year to year. In most highland areas the rainy season is confined to two short periods: a spring (April, May) and a summer (July and August) but on the coast rain falls mainly in winter.

16. While uncertain, the rainfall regime of Yemen is also characterized by short-lived, intense storms that generate flash floods, interspersed between the long dry periods of severe drought. For example, on 24-25 October, 2008, flash flooding claimed the lives of 180 people, destroyed 2,000 houses and displaced more than 10,000 in the Hadramout and Al Maharah Governorates.[17] More recently, on May 5, 2010 heavy rains hit the Capital Sana'a causing 9 deaths, resulting in the collapse of many houses in old Sana'a, and disrupting electricity service for several days.

17. Lengthy droughts are common to all regions. A serious drought occurred during 1962–70 and had lasting social and economic consequences. More recently a severe drought was reported to have caused displacement of thousands of residents in Mahwit governorate, some 113 km northwest of the capital Sana'a, to abandon their mountainous villages and move to cities.[18]

18. High evapotranspiration rates reduce the amount of rainfall that can be used. Low humidity and high temperatures cause high rates of evapotransipration loss - ranging from 1800 mm to 2500 mm a year. The amount of rainfall that is retained in the soil profile for beneficial use by agriculture is no more than a small fraction of the total 37 km3 which falls as rainfall.

Expected Impacts of Climate Change and Variability

THERE ARE ALMOST NO RELIABLE LONG-TERM SERIES OF CLIMATIC DATA FOR YEMEN…

19. Long-term, systematic records of rainfall and temperature are very scarce in Yemen. Although monthly data are available for Aden since the 1880s, daily records typically begin in the 1970s or later, many are tied to short-term projects, and some are of unreliable quality. This lack of data severely hampers efforts to quantify long-term changes in climate and to assess renewable natural resources such as water. Nonetheless, the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (FAR) projects higher rates of warming over East Africa and the Arabian Peninsula than the global average.[19]

SO UNCERTAINTY IN PREDICTING IMPACTS IS LARGE

20. Since the 1950s, summer precipitation totals have declined across a swathe of the Sahel, extending into the Yemeni Highlands. However, local data for Yemen are lacking and there are

16. Library of Congress – Federal Research Division Country Profile: Yemen, December 2006
17. Office for the Coordination of Humanitarian Affairs (OCHA) Situation Report #2 on Yemen floods, issued 29 October 2008.
18. Yemen Times. 21 April 2008.
19. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (FAR) presented global climate scenarios with average warming in the range of 0.6°C to 4°C over the twenty first century, and rises in sea level of 0.18 to 0.59m (IPCC, 2007).

differences between data sets. The University of East Anglia's Climatic Research Unit's (CRU's) country summary indicates a weak drying trend of -1% per decade throughout the 20th century, consistent with the majority of sites (most notably Sana'a and Ta'iz).[20]

21. There may also have been shifts in rainfall distribution within years. Annual totals can conceal changes in seasonal distribution of rainfall. For example, a long-term decline in rainfall at Ta'iz largely reflects lower totals in the four months April to July, somewhat balanced by higher rainfall in other months, with significant implications for agricultural production, especially of rainfed agriculture.

22. A recent set of studies has sought to reduce the uncertainty of climate projections for Yemen. In the absence of consistent climate change projections amongst various models and lack of adequate historical climate data, the World Bank (in cooperation with the Environment Protection Authority) commissioned a series of studies of climate change to project climate change scenarios for Yemen,[21] assess climate change impacts on the agricultural and water sectors, review of climatic data to inform adaptation strategies for agrobiodiversity resources,[22] and outline possible policy and program responses.[23]

23. These studies of Yemen's climatic data concluded that without homogeneous rainfall and temperature records, it is difficult to benchmark future climate variability and change, or the associated impacts.[24] Both studies recommend improving the density of Yemen's meteorological network and streamlining the currently complex institutional arrangements for harmonizing, collecting and analyzing data.

24. The World Bank study prepared three simplified climate change scenarios to illustrate the range of possibilities up to 2080. The three simplified climatic scenarios 2010-2080 are:

- A *"hot and dry"* scenario of higher warming of 2 to 4.5 °C, with aridity dramatically increased due to the combined effects of low rainfall and high evapotransipration.
- A *"mid"* scenario, with considerable warming of 1.6 to 3.1 °C but no significant change in rainfall.
- A *"warm and wet"* scenario with lower warming of 1 to 1.6 °C and an increase in rainfall.

20. According to AREA and CAMA, the estimated rainfall reductions in Sana'a since the 1960s were -9% to -43% respectively. Four stations show rainfall increases in the CAMA data set, ranging between +3% at Aden and +27% at Al-Nogob. However, no station shows rainfall increases in both the CAMA and AREA records, underlining the sensitivity of detected trends to the influence of outliers, record start-date, length and source.

21. Wilby, R. (2009): An evaluation of climate data and downscaling options for Yemen.

22. Technische Universität Dresden (2009): Interim Report - Adaptation to Climate Change Using Agrobiodiversity Resources in the Rainfed Highland of Yemen (GEF- Project).

23. World Bank (2010): Assessing the Impact of Climate Change and Variability on the Water and Agriculture Sectors, and the Policy Implications. Report No. 54196-YE.

24. Wilby (2009) notes: "Given the brevity and quality of records, and sparse networks, there is limited scope for evaluating long-term trends in climate variables, especially for extremes." The Technische Universität Dresden Report (2009) similarly concludes that with present knowledge: "climate modeling has only a limited chance to contribute to the expected adaptation process in the agriculture in the rainfed highlands of Yemen. This has various reasons: (i) precipitation is a tricky climate element and projections on precipitation trends are bound to fail, (ii) Yemen lies in a latitudinal band were global circulation models differ in projected precipitation trends, (iii) the effect of complex orography (typical for Yemeni highlands) is poorly modeled in current and probably as well in future climate models, and (iv) data to validate existing climate model output against measurements."

25. These scenarios were applied at the national level and also applied to case studies at basin/ sub-basin levels. The effects of climate change were assessed at the national level against the simplified scenarios, using 'downscaled' average annual and monthly temperature and precipitation changes.[25]

26. The modeling results indicate that there is no certainty about the expected direction or size of change in runoff, recharge or evapotransipration (ET), (Table 1). The 'warm and wet' pattern would be on the whole good for Yemen as increased runoff and recharge would make more water potentially available as surface and ground water, and the resulting higher ET can be reflected in increased crop production. Risks of floods and erosion would, however, increase.

Table 1: Annual Changes in Runoff and Recharge for Different Climate Scenarios

Scenario	Year	Runoff	Groundwater Recharge	ET	What to expect
Baseline	1990s	0%	0%	0%	
Mid	2030s	4%	4%	2%	Large increase by the 2050s, then decline below current levels. A modest increase in groundwater recharge until about 2050, followed by a decline reaching about 12% by 2080. Little change in ET.
	2050s	30%	2%	2%	
	2080s	-22%	-12%	0%	
Hot & Dry	2030s	-55%	-31%	-6%	A large drop in runoff, of one half or more. Groundwater recharge rates decline by more than a half by 2080. ET declines steadily as aridity increases.
	2050s	-32%	-32%	-6%	
	2080s	-78%	-55%	-11%	
Warm & Wet	2030s	147%	54%	13%	A doubling in runoff through most of the century, reducing somewhat in the second half. Groundwater recharge up by 50% by 2030, tapering off by 2080. ET well up, although dropping back a little after 2050.
	2050s	137%	41%	10%	
	2080s	66%	27%	9%	

Source: World Bank. 2010. Assessing the Impact of Climate Change and Variability on the Water and Agriculture Sectors, and the Policy Implications. Report No. 54196-YE.

27. The 'hot and dry' scenario would reduce water availability from both surface flows and groundwater by one half or more, with severe impact on an already water-stressed society. The lowered ET, reflecting lower water availability despite higher temperatures, would translate into reduced agricultural output. The 'mid' scenario offers an improving picture for both surface and groundwater until mid-century, followed by a slow decline: under this scenario Yemen would have a breathing space in which to adjust to a less water-dependent economy.

DESPITE THE UNCERTAINTY, SOME GENERAL INFERENCES CAN BE DRAWN…

28. Although data for Yemen are very sparse, there appears to have already been some increase in temperatures in the twentieth century. Climate indices derived for the Middle East and the Arabian Peninsula show rising mean and nocturnal temperatures since the 1950s. The only station with a long time series of data, Aden, showed a rise equivalent to about 1.4°C during the twentieth century. Some investigators calculated warming of 0.5°C throughout the entire 20th century. [26] The data trends suggest

25. Wilby, R. (2009): An evaluation of climate data and downscaling options for Yemen.
26. The UEA Climatic Research Unit's (CRU) 0.5° global gridded data set provides a country-average indicator of rainfall for 1901 to 2000 (http://www.cru.uea.ac.uk/~timm/cty/obs/TYN_CY_1_1.html).

that warming since the 1960s has been more rapid, particularly at higher elevation sites such as Sana'a. No site has shown a cooling trend since the 1960s.

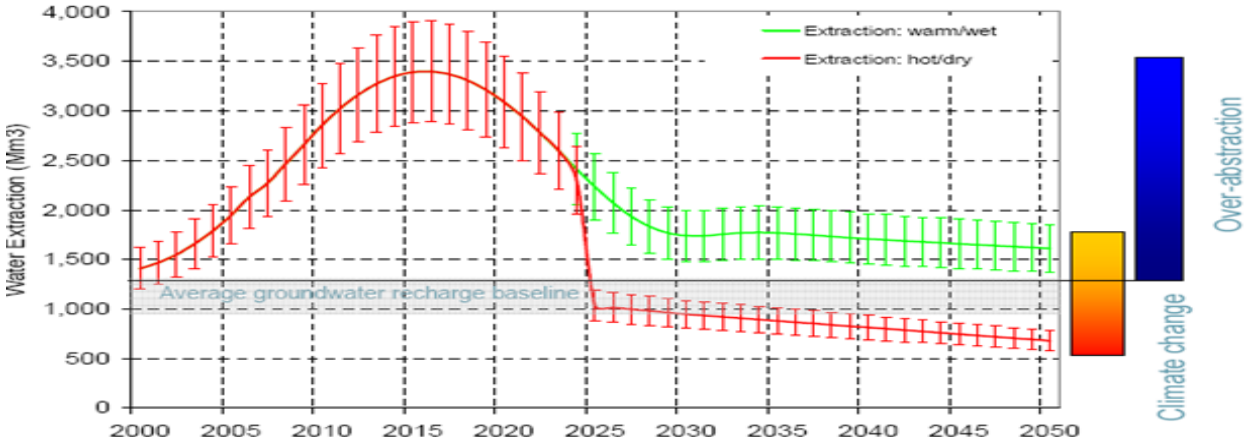
29. All three models used in Yemen's National Adaptation Plan of Action suggest an increase in rainfall variability and heavy precipitation events, which will effectively reduce useful average rainfall during the growing season. Two of the models quoted in the NAPA project significant increases in rainfall (of 10% and 21% in the spring months), whilst the third suggests a decrease of 13%. These large uncertainties are partly related to differences amongst models in the future behavior of the Inter-Tropical Convergence Zone (ITCZ) over East Africa and the Middle East and the complexity of the modeling process.

30. The projections confirmed that national and local predictability of climate is low for Yemen. While there is no clear consensus about the sign of the projected changes in rainfall totals for Yemen, there is strong agreement that temperatures will increase. The median temperature projection suggests a warming of over 4°C by 2100. In contrast there is little agreement on the direction or magnitude of changes in rainfall, other than to confirm the likelihood of increasing unpredictability and of concentration of rainfall in more intense events.

… REGARDING IMPACTS ON GROUNDWATER AND RIVER BASIN HYDROLOGY

31. Climate change will clearly affect groundwater recharge but the potential range of impact resulting from climate change is about half the impact of unregulated mining of groundwater. (Figure 3.) Groundwater provides the principal means to buffer seasonal and inter-annual variations in rainfall but depends on rainfall for its replenishment. Based on current high water consumption for irrigation and water supplies, modeling results predict that groundwater reserves will be exhausted by about 2025-2030.[27] Thereafter, groundwater extraction would be limited to recharge levels, higher in the case of the 'warm and wet' scenario, lower in the case of the 'hot and dry' scenario. Higher recharge under the 'warm and wet' scenario may delay exhaustion of reserves for a few years, but under all scenarios groundwater extraction will drop well below present extraction levels. Under the 'warm and wet' scenario, groundwater availability after 2025 would be about half present extraction rates, and under the 'hot and dry' scenario, about one quarter.

Figure 3: Projected Changes in Groundwater Recharge and Extraction



Source: World Bank. 2010 ibid.

27. According to the modeling exercise different aquifers and basins respond differently, based on the natural rate of groundwater recharge and current water reserve in the aquifer.

32. Impacts of climate change on surface water flows are more difficult to predict. Two case studies based on models show that the adaptive planning response to climate change will vary from watershed to watershed given the topographic and climatic diversity of Yemen (Box 1).[28]

Box 1: Predicted impact of climate change on surface water flows

In Wadi Surdud that drains from the western highlands into the Tihamah, the prediction is that flows will vary little in frequency from the present, but the volume of flows may change – ranging from a decrease of 20% ('hot and dry') to an increase of 30% ('warm and wet'). Over-abstraction of the coastal aquifer will continue even in the wettest scenarios. Here the planner would probably best conclude that improving management of the watershed (to increase recharge and reduce erosion) together with socially equitable improvement of spate and groundwater management would be prudent policies. In Wadi Surdud these solutions would apply whether the climate changed or not.

In the Wadi Hadramawt basin that drains to the Arabian Sea (where damaging floods occurred in 2008) variability in the timing, frequency and intensity of rainfall is likely to be a significant risk, and spate and flood flows may increase in volume and frequency under both the 'mid' and 'warm and wet' scenarios. Under the 'hot and dry' scenario, flood flows would be smaller and rarer. Despite the smaller risk shown by the 'hot and dry scenario', there is a possibility of a repeat of the 2008 floods or of even more severe events. Adaptation strategies could include (a) rehabilitation of irrigation systems with reinforcement of flow structures and appropriate diversion structures for drainage of flood waters; (b) prevention of development within the wadi bed and ensuring that vulnerable buildings are raised above flood levels or protected; and (c) the development of appropriate flood forecasting and early warning systems with robust communication strategy in order to prevent loss of life and property before/during flood events. In Wadi Hadramawt climate change is likely to have significant impacts on the hydrology and there is clearly a need to adopt climate adaptation strategies.

Source: World Bank. 2010 ibid.

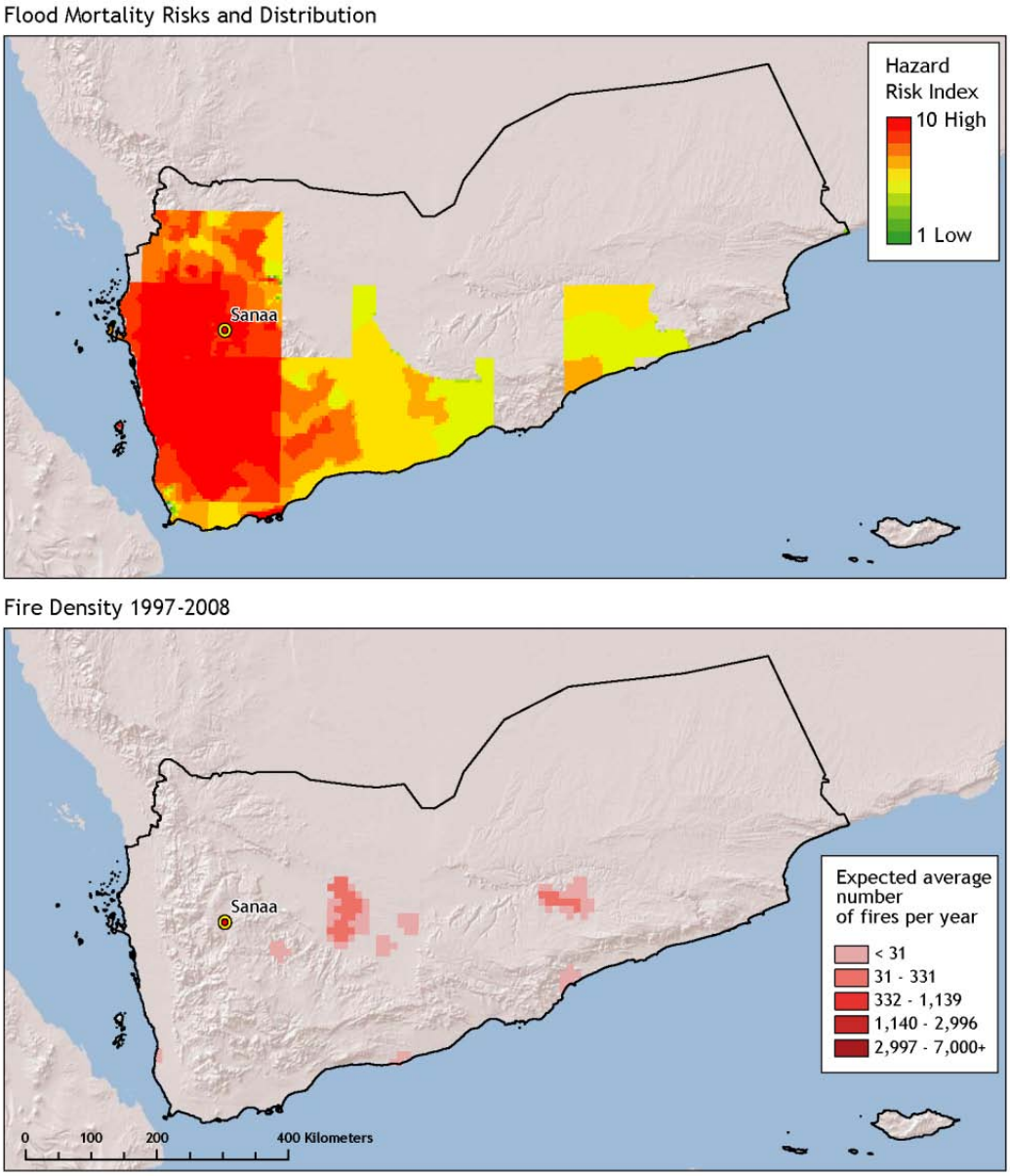
33. In addition to the direct impacts of climate change on hydrology and groundwater, Yemen's National Adaptation Plan of Action (NAPA) identifies seven key areas of risk Yemen will face as a result of climate change.[29] The latest mapping of some hazards and risk is shown in Figure 4.

- **Increased water scarcity and reduced water quality** – leading to increased hardship on rural livelihoods;
- **Increased drought frequency, increased temperatures, and changes in precipitation patterns, as well as increased number of flash floods** – leading to degradation of agricultural lands, soils and terraces;
- **Deterioration of habitats and biodiversity** – leading to expansion of desertification;
- **Reduced agricultural productivity** – leading to increased food insecurity and reduced income generating activities;
- **Increased sea levels** – leading to deterioration of wetlands, coastal mangrove migration, erosion, infrastructure damage, and seawater groundwater intrusion;
- **Increased climatic variability** – leading to the possibility of spread and growth of vector borne and water borne diseases; and
- **Impacts on coastal zones** – leading to a loss of tourism/economic activity due to sea level rise, including loss of beaches.

28. The case studies were based on daily hydrological model that enabled simulation of the potential impacts of climate change on the soil moisture balance and frequency of higher flows.

29. Environment Protection Authority. (2009). National Adaptation Programme of Action. Submitted to the UNFCCC by Government of Yemen. Available online: http://unfccc.int/resource/docs/napa/yem01.pdf

Figure 4: Exposure to Climate-related Hazards across Yemen



Source: Preliminary risk maps from WHO e-atlas of disaster risk for Eastern Mediterranean Region, 2008; population density map from LandScanTM Global Population Database (2006). Oak Ridge National Laboratory: http://www.ornl.gov/landscan/ in: Disaster Risk Management Programs for Priority Countries: Republic of Yemen.

Sectors Most Vulnerable to Climatic Change

WATER SECTOR

GROUNDWATER RESERVES ARE HEADED FOR EXHAUSTION REGARDLESS OF CLIMATE CHANGE

34. The rate of groundwater overdraft is currently twice the recharge rate, and is increasingly depleting water reserves with negative socio-economic consequences (Box 4). This depletion is due in large part to agricultural use, but will have implications for all water users. Reforms to tackle water problems have been underway for a decade but little headway has been made in reining in the rate of groundwater overdraft. [30]

Box 2: Competition for Limited Groundwater Can Lead to Rural Impoverishment

Water levels in many wadis near Ta'iz have declined substantially due to groundwater pumping. In some cases the lower portions have dried out completely. Lower Al Hima wadi – below the Ta'iz municipal well field – illustrates the impact of water scarcity on local populations. In upper stretches of the wadi running through Al-Hima and Habeer, irrigated agricultural fields contain a rich array of qat and other crops. The municipal wells for Ta'iz urban supply are also actively diverting large amounts of water from the wadi bed and underlying formations. The supplies that fulfilled agriculture and domestic needs in the lower wadi have been diverted to other uses. In the 1980s, lower Al Hima was a vibrant agricultural community. Local inhabitants grew a wide variety of irrigated crops and there was a small horticultural station run by the Department of Agriculture. Now the area is dry. Dead trees surround the deserted agricultural extension office. Drying Qat plants struggle to survive in fields irrigated through expensive purchases of water brought in by tanker from distant locations. Most agriculture now depends on rain. Drought resistant millet, which produces only a small crop of grain and fodder, has replaced the high value fruit, vegetable and Qat crops that provided the economic base for local villages. Even drinking water is in very short supply. Children, women and men travel long distances by donkey or camel to collect water at the few tap stands that still run. With the decline in agriculture, populations in the lower Al Hima area have been forced to depend on other activities to support themselves. Many families survive from hand to mouth. Income from a brother, son or father working abroad or in the city is the primary basis for survival. Most of the men remaining in the village travel out to Ta'iz city daily and seek work as casual laborers. Poverty has become a way of life and few see avenues to improve their condition.

Source: Moench, M. 2002. Groundwater and poverty: exploring the connections. Chapter 21 in R. Llamas & E Custodio, eds. *Intensive use of groundwater challenges and opportunities*. 478 pp. Abingdon, U.K.

ACCESS TO POTABLE WATER SUPPLIES IS GETTING WORSE…

35. Yemen is one of only 11 countries whose access to drinking water sources contracted in the decade ending in 2010.[31] In 2000, 65% of the population had access to improved water supplies - by 2008 this had declined to 62%. Urban areas fared less well than rural areas: the share of urban populations with access to improved water supplies fell by 10% to 72%. In contrast access by rural populations fell by only 2% to 57%.

PARTICULARLY IN THE CITIES…

30. Total groundwater recharge in 2003 was estimated by NWRA to be about 1.5 km3 a year, based on the WRAY analysis. The hydrology modeling in World Bank (2010) Phase II suggests that recharge is somewhat less (about 1.3 km^3 a year). Estimates of the number of boreholes and average borehole yield suggest that groundwater extraction is currently about 2.5 km^3 a year. The drawdown of groundwater reserves is about 1.2 km^3 a year. Available data suggests that the rate of overdraft may still be on the increase in a 'race to the bottom'.

31. WHO/UNICEF. 2010. Progress on Sanitation and Drinking Water. 2010 Update.

36. The factors behind the deterioration in urban service provision are population growth, competition for limited groundwater resources and inefficient water supply institutions. Urban water demand was less than 10% of renewable water supplies in 1990 but this is expected to have doubled by 2010. The concentration of population in the relatively water-scarce highland basins - especially in Sana'a and Ta'iz - is leading to extreme water constraints in towns and to aggravated competition for water between the urban and rural sectors. In the Sana'a Basin, for example, there are over 8,000 operational wells – but only 70 for public water supply. New supplies for the municipalities will depend on moderating agricultural use that is using groundwater at the rate of 3.4 km^3 a year compared to natural recharge of 2.1 km^3 a year. More recent analysis suggests that the water resources of Sana'a basin could become exhausted in the next two to three decades provoking an acute water crisis. Such a crisis could seriously undermine municipal public health, lead to a collapse of irrigated agriculture and incomes dependent on it, induce conflicts over the remaining water resources, and eventually lead to mass migration of millions of people to the coastal areas.[32]

37. Sana'a's water problems are not unique. Continuously falling groundwater levels – the result of ineffective regulation – are driving up the costs of municipal water supplies in all areas of the country.[33] Coastal areas are better endowed, but coastal aquifers are also being mined, particularly along the Aden coast and in the Tihama, leading to quality deterioration and saltwater intrusion.

38. Modern potable water supply in urban areas has been developed by both public and private sectors. Public schemes operate in most large towns but have low efficiencies and poor coverage. Private and community piped schemes exist in some places, usually on a small scale. Development emphasis of the water utilities has been on improving current service levels, and rehabilitation rather than expansion which was identified in the 2007 Poverty and Social Impact Assessment as the most pro-poor measure to increase access. In most cities, private supply by tanker or bottled drinking water is a vital supplement to erratic and inadequate public supply. In Ta'iz, where the shortfall in local water supply is 32 million m^3/year, basic needs are being met by water trucked in from distant wells at US$4-5 per m^3. Although access to urban sanitation is 94%, this is largely by cesspits. Where sewer systems exists – Aden, Sana'a Hodeidah, Ta'iz and Al Mukulla, – wastewater treatment may be as much as 43 million m^3/year but reuse is minimal.

…BUT ALSO IN RURAL AREAS

39. Rural drinking water supply and sanitation coverage are both alarmingly low. In rural areas, water is traditionally drawn from springs or wells, or from ponds that collect run off. Current coverage is estimated at 57% for water supply and 33% for sanitation, one of the lowest coverage rates in MENA. Progress has been made in coverage and cost effectiveness, but implementation weaknesses persist and sector institutions are only now aligning and cooperating. A continuing bias towards mechanized systems based on groundwater marginalizes attention to, and investment in, rainwater harvesting.

THERE ARE NEGATIVE IMPLICATIONS FOR GENDER…

40. Responsibility for water collection in rural areas remains with women and girls. In rural areas women are responsible for fetching water in 79% of male-headed households and 84% of female-headed households. In contrast, water supply in cities has become a man's responsibility: women were

32. Government of Yemen. 2010. Sustainable Water Resources Management.
33. The largest fall in groundwater levels are in the Sana'a basin 6 to 8 m/year, followed by Sa'adah basin 5 to 6 m /year, Radan basin 5 m/year, Amran basin 3 m/year and Ta'iz 2 m/year. Declines in the Tihama have been 1 to 3 m/year and in the Tubna delta 0.2 to 1 m/year.

responsible for fetching water in 26% of male-headed households compared with 43% in female-headed households.[34]

…AND FOR HEALTH

41. Poor sanitation and poor water management continues to foster the spread of water-borne diseases. Yemen is still in the early stages of an epidemiological transition as the morbidity and mortality rates from communicable diseases are still predominant, and those for non-communicable diseases are also rising. The most prevalent water-related conditions are diarrheal diseases, malaria and schistosomiasis. Overall, it is estimated that at a minimum 3 million individuals are infected with schistosomiasis of which about 600,000 suffer from clinical morbidity.[35] The burden of disease has important implications in terms of productivity loss and likely impact on the country's economic and social development. Higher temperatures may exacerbate the incidence of water-related diseases.

CLIMATE CHANGE WILL LIKELY AMPLIFY PRESENT SUPPLY AND ACCESS PROBLEMS

42. Whatever happens to rainfall, rising temperatures will increase agriculture water demand. This will affect water supplies for domestic and municipal use as they are in competition for the same water resources. In most areas of Yemen water supplies are from groundwater and increased demand from all sources will increase the costs of accessing groundwater. Increased operational costs for water utilities and suppliers will probably slow expansion of service coverage, particularly as Yemen's high levels of poverty will limit consumers' ability to pay the full cost of supplies. Given the scale of the immediate water supply challenge, current planning to 2020 includes water conservation and supply augmentation measures that can also be utilized to mitigate the impact of climate change on water supplies.[36]

AGRICULTURE

AGRICULTURE IS IMPORTANT IN YEMEN'S ECONOMY AND SOCIETY…

43. Agriculture plays a leading role in Yemen's economy. It accounted for about 14.3% of GDP in 2007 and employs about 53 percent of the total labor force:

- Since 2004 annual agricultural growth has fallen below 1 percent. Even so, Yemen appears to be coming more reliant on its agricultural sector: agricultural contribution to GDP had increased from 10.3 percent in 2000 because of reduced growth in the industrial, manufacturing and service sectors over the same period.
- Total cultivated areas have not increased significantly since 1970, ranging from 1.1 to 1.3 million hectares.
- Large yield gaps compared with neighboring countries suggest that there is potential for productivity-led agricultural growth – cereal yields are less than half of the average of other Middle Eastern countries (FAO 2009).
- Livestock is also a major subsector: more than 8 million sheep, goats and cows graze the land and contribute at a minimum 20 percent of farm production in the Highlands and Tihamah. For households with inadequate landholdings livestock is a major source of cash income. Animal production is 14 times more powerful at reducing poverty than qat and horticulture production. [37]

34. Pelat, F. A brief overview of the water and gender situation in Yemen. Workshop on Gender Mainstreaming in IWRM in the Arab region. July, 2006. Beirut, Lebanon.
35. World Bank. Health and Population Project (P095755). December 21, 2010.
36 Government of Yemen. 2010. Op. cit. page 4.
37. World Bank. 2010. Republic of Yemen Coping Strategies in Rural Yemen and Policy Implications. Report No. 51927-YE. June 10, 2010

44. Agriculture will have a key role to absorb labor and provide incomes given the demographic explosion in this still largely rural country. Only thus can an uncontrolled and impoverishing rural exodus be avoided.

- A quarter of Yemen's population – almost 6 million people – is directly dependent on agriculture for their livelihoods. Three quarters of the rural population depend on local production for the provision of their food requirements.
- Women have a key role in land cultivation that is enhanced by the periodic absence of rural males to work in the surrounding countries in the region (Box 3).
- Poverty levels in rural areas are 47.9%, almost twice the incidence found in urban areas because of the high level of subsistence farming, significant natural risks (climate and pests), lack of access to credit and rudimentary rural markets.[38]
- Households dwelling in rural areas receive nearly 40% of total income from agriculture, complemented with wages (26%) and private business (16%).
- Food insecurity follows a similar rural-urban differentiation: 36.6% in rural areas compared with 19.9% in urban areas (IFPPI 2010).
- More than 40% of the youngest children in Yemeni households are underweight, considerably more than half of the children are stunted, and about a tenth of all children are affected by starvation and hunger.
- According to the IFPRI (2010) people are vulnerable to falling into food insecurity due to shocks such as food price surges and climate variability.

45. Food insecurity is far more widespread in rural areas than in urban areas—37.3 percent in rural compared with 17.7 percent in urban areas, Figures 5 and 6.[39]

46. In the worst cases, disputes over land and water are known to lead to violence. According to Government of Yemen estimates, violence accompanying land and water disputes results in the deaths of some 4,000 people each year, and access to water is frequently the trigger.[40]

Box 3: Yemen - Women and the Water Crisis

Yemen's water crisis has affected women adversely in different ways. Groundwater irrigation for cash cropping has resulted in aquifer depletion in different agro-ecological regions. Traditional sources of water-harvesting structures are no longer maintained. Women and young girls travel longer distances for water in rural areas, affecting their health, safety, and literacy levels. As more men migrate to cities and other Gulf countries, women's role in irrigated agriculture has increased, although it is not always formally acknowledged because commercial cultivation was traditionally a man's preserve. In the case of urban water supply, richer households purchase water from tanks, whereas poorer women have to line up either to buy water from richer neighbors, to obtain lower quality water from wells, or periodically to fetch water from municipality water projects.

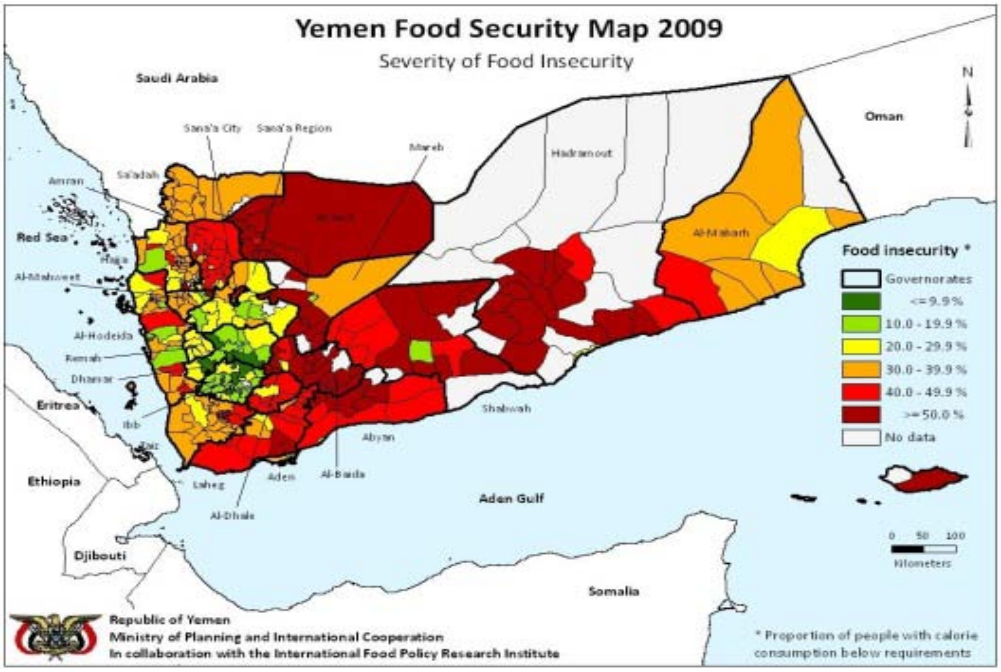
Source: Frédéric Pelat, "A Brief Overview of the Water and Gender Situation in Yemen,"www.idrc.ca/en/ev-99527 201-1-DO_TOPIC.html.

38. Breisinger C., M-H. Collion, X. Diao, P. Rondot,. 2010. Impacts of the triple global crisis on growth and poverty in Yemen. IFPRI Discussion Paper. Forthcoming.

39 **:** International Food Policy Research Institute. 2010. *Assessing Food Security in Yemen – An Innovative Integrated, Cross-Sector, and Multilevel Approach.* IFPRI Discussion Paper 00982.

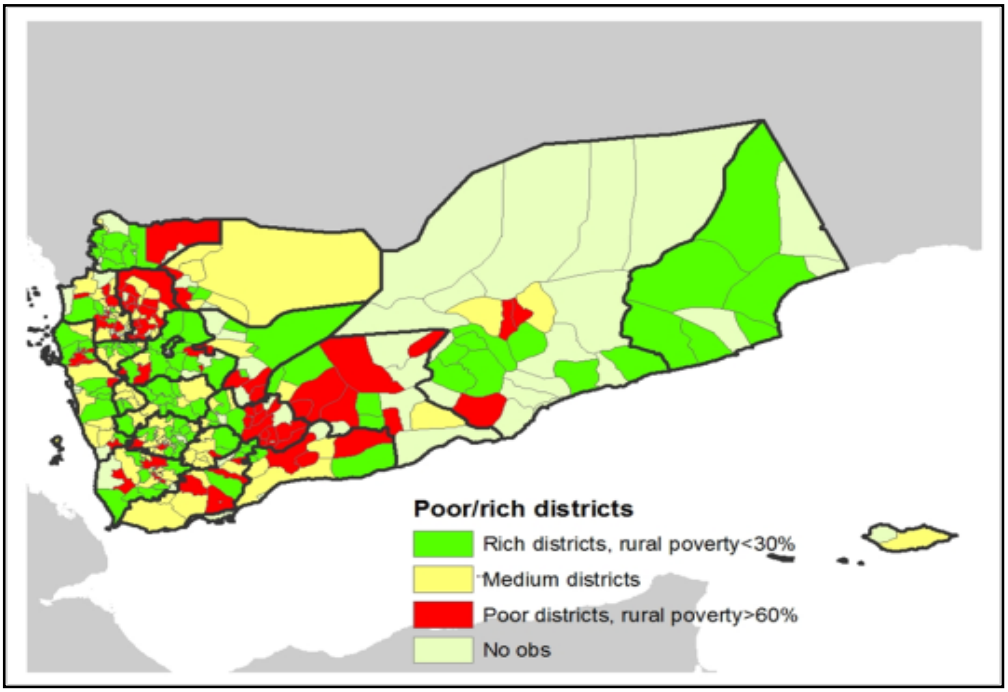
40. Yemen Armed Violence Assessment. 2010. Under Pressure: Social violence over land and water in Yemen. Issue Brief No.2. October 2010.

Figure 5: Food insecurity by severity in 2009



Source: International Food Policy Research Institute. (2010). *Assessing Food Security in Yemen – An Innovative Integrated, Cross-Sector, and Multilevel Approach.* IFPRI Discussion Paper 00982.

Figure 6: Location of poor, medium poor and rich rural districts (poverty rate)



Source: World Bank. (2010). *Coping Strategies in Rural Yemen and Policy Implications.* 51927-YE. The World Bank: Washington

AND WILL BE VERY NEGATIVELY IMPACTED BY DEPLETION OF FRAGILE WATER RESOURCES…

47. About half of the agricultural land in Yemen is rain-fed. An additional 15 percent of land is directly dependent on rainfall: through flood irrigation (10%) and from water stored behind dams (5%). The balance depends on groundwater.

48. Yemen's groundwater reserves are likely to be mostly depleted in another two to three decades, irrespective of climate change. Agriculture is estimated to use 93% of available surface and groundwater – about 400,000 ha or 35% cultivated area depend on groundwater alone. However, rapid increases in water abstraction and use have affected the water balance. As a result, the current dependence of agriculture on dwindling water resources is not sustainable. Groundwater depletion could reduce agricultural output by up to 40%. This will have serious repercussions on the rural economy given that the growth of irrigation has been the principle source of work and incomes in rural areas.

49. Total irrigated area doubled in the three decades from 1970 and had a huge effect on the cropping pattern – the area under cash crops has shot up from 3% of the total in 1970 to 14% today, and production of high value fruit and vegetables has increased by 20 times, from 40,000 tons annually in 1970 to 800,000 tons today.

50. There is a large, fast-growing domestic market, and demand is likely to continue to move "up market" to higher value foods as urbanization continues and incomes gradually rise. Demand from industry could also increase for cotton and fruit. Export niches also exist: original Mocha coffee, frankincense, myrrh, and saffron.

51. Because there is no consensus on the nature of the climate scenario that Yemen will face, it is difficult to predict what the precise impact will be on agriculture. However, there is agreement that crop production will worsen over time, on average. Even in the most optimistic scenario *("warm and wet")*, production increases initially but time will see that increase worn away during the middle and later parts of the century, because all scenarios predict a decline in rainfall after 2050. Temperature effects on crop production are complex and affects crops differently based on altitude: lowland crops are negatively affected by temperature increase, but highland crops may be improved. Table 2 shows a summary of expected temperature and rainfall changes and resultant change in crop production under the three scenarios modeled.

Table 2: Marginal Impact of Climate Change Scenarios on Crop Production

	Mid			Hot and Dry			Warm and Wet		
	2030	2050	2080	2030	2050	2080	2030	2050	2080
Temperature (^{0}C)	+1.6	+2.0	+3.1	+2.0	+2.6	+4.5	+1.0	+1.2	+1.6
Rainfall Change	+3%	-3%	-3%	-13%	-13%	-24%	+25%	+20%	+13%
Crop Production	+1%	+1%	-6.3%	-11%	-11%	-27%	+14%	+12%	+7%

Source: World Bank. 2010. *Assessing the Impact of Climate Change and Variability on the Water and Agricultur Sectors, and the Policy Implications.* Report No. 54196-YE. April 21, 2010.

52. Agriculture is the sector most vulnerable to changes in the precipitation regime. Changes in temperature will affect cropping patterns, times of planting and harvesting and important ecosystems that, for example, facilitate pollination. Increased temperatures will increase evapotranspiration. Precipitation

and temperature changes will also affect Yemen's natural ecology and biodiversity, including the incidence of pests.

53. Climatic disasters have wide-ranging impacts, with agriculture taking the lion's share of damages in recent Yemeni experience. In the 2008 Hadramawt flood disaster, individual sector damage and losses were, in the order of decreasing importance: agriculture; industry, commerce and tourism; housing; and transport. In terms of destruction of physical assets, agriculture was the most affected (63% of total damages), followed by housing (18%) and transport (7%). In terms of losses in the economy, agriculture was again the most affected (64% of the total losses), followed by industry, commerce and tourism (26%), transport (3%), housing (2%) and other sectors (5%).[41] Thus the disaster was more productive-social than infrastructural in effect.

54. Human changes to the landscape will exacerbate the impact of climate change. According to the Strategic Environmental Assessment of the Coastal Zone, much of the loss of human lives, infrastructure and livestock caused by the flash floods in 2008 that hit Ta'iz, Hadramawt and Al-Mahara governorates in 2008 following torrential rainfall was caused by unplanned constructions and other uses which clogged the wadi beds and greatly increased the flow speed of the floods.[42] Watershed management upstream and basin management in the wadis would thus need to address the problems of extreme flooding events and deposition of silt and contaminants.[43]

Adaptation of Agriculture to Climate Change and Variability in Yemen

55. It is likely that rainfed agriculture and livestock will become the mainstays of the sector. Only a third of irrigated agriculture is sustainable at current rates of groundwater mining and water use efficiency. Climate change and variability will require a wide range of adaptive measures in agriculture in addition to those required to address current sector problem, including:

- Major reorientation of agricultural development policies and priorities to ensure that the productivity of rainfed agriculture is maximized.
- Improved water use efficiency in irrigation.
- Recovery and improvement of traditional rainfed agricultural practices and a better understanding of their links to natural ecosystems. While some natural pest-control, pollination, soil-stabilization, flood-control, water-purification, and seed-dispersal services can be replaced when damaged or destroyed by climate change, technical alternatives may be costly even when feasible. Conserving biodiversity (for example, genetic diversity of food crops, trees, and livestock races) means that options are kept open to allow human societies to adapt better to climate change. Promotion of on-farm conservation of rainfed crop diversity may serve a similar function. In addition this could provide female employment opportunities from the management of apiaries.
- Developing models for the restoration and cost-effective utilization of traditional small-scale water-harvesting and rejuvenation of terrace agriculture. Historically many of these areas supported coffee plantations but they also have potential for other high value crops such as saffron, grapes and apricots.

41. Damage, Losses and Needs Assessment October 2008 Tropical Storm and Floods, Hadramawt and Al-Mahara, Republic of Yemen. A Joint Assessment of the Government of Yemen, the World Bank, the United Nations International Strategy for Disaster Reduction, the International Federation for the Red Crescent and Cross, supported by the Global Facility for Disaster Risk Reduction.

42. GOPA/BIKF. 2010. Yemen Strategic Environmental Assessment of Coastal Zone Management. March 2010.

43 Such issues are currently being piloted by the World Bank Projects "Flood Protection and Emergency Reconstruction" and the associated "Ta'iz Municipal Development and Flood Protection".

- Promoting export markets for rainfed crops.
- Expanding traditional crops that have high international demand and export potential and multiple cropping potential – e.g. frankincense and myrrh.

COASTAL ZONE MANAGEMENT

YEMEN HAS AN IMPORTANT COASTAL PRESENCE…

56. The coastline of Yemen is over 2,200 km long and includes three different coastal regions, namely the Red Sea, Gulf of Aden and Arabian Sea. The Red Sea region represents about one third of this coastline, with the remainder bordering the Gulf of Aden region. The Red Sea and Gulf of Aden region of Yemen represent a complex and unique tropical marine ecosystem with extraordinary biological diversity and a remarkably high degree of endemism.[44] Over 120 islands lie in the waters of Yemen with distinct climatic and natural characteristics.[45]

57. The past years have seen a steady movement of people from the agricultural hinterland toward the coastal areas, resulting in an estimated population living in the immediate coastal areas of 3.5-4 million; about 1.3 million of them aggregate in the three main coastal urban centers: Aden, Hodeidah and Al Mukallah. The remainder population lives in 83 coastal villages and towns and an unknown number of dwellings. Annual growth rates of the coastal population are expected to exceed the mean national level of 3% due to continued migration from the hinterland.

WHICH IS ECONOMICALLY IMPORTANT TO THE COUNTRY…

58. The coast is also a source for a wide range of services. These range from freshwater inflows from upstream wadis, spate and groundwater-based agriculture, timber, minerals and fuels, habitats, a depository for sediment derived from upland erosion, ,soil formation and retention, erosion regulation and natural hazard regulation to cultural heritage, spiritual and religious values and recreation and aesthetic values. Yemen's coastal areas and the services it provides are a natural hub for economic and social development. The country's only duty-free-zone is located in Aden. One of government's main priorities is to make the city of Aden an international trade center and a cornerstone in the economy.

FISHERIES

59. The fisheries sector is the second most important source of export revenues after petroleum products and currently contributes an estimated 2-3% to the GDP. Current fish exports have already become important sources of foreign exchange, totaling an estimated US$ 35-45 million in 2002. Key political stakeholders consider the sector to be of critical and growing economical importance to the country, especially given the uncertain future of export revenues from oil and natural gas. Various sources, including the Ministry of Fish Wealth (MFW) and the World Bank, expect it to have the potential to contribute up to 5% of annual GDP, to provide employment for some 3% of the population, and to thus to help Yemen implement its Poverty Reduction Strategy (PRSP).[46]

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44. There are at least 90 species of corals and a great diversity of fish (416 species), 82 species of sea and shore birds, 625 species of mollusks, algae (485 species), phytoplankton (283 species), as well as four species of marine turtles, including the most important nesting beach for green turtles in the entire Arabian Region at Ras Sharma.
45. Socotra Island, the largest Yemeni island (nearly 3,625 km2), is located in the Arabian Sea region of Yemen and has a more exuberant and diverse flora and fauna than any other region in the Arabian Peninsula. Most corals and coral habitats exist around the Yemeni islands, but with different diversity of communities and number.
46. Zajonz, U. & Akester, S.J.A. (2005).

60. The coastal waters of Yemen are characterized by high levels of primary and secondary bio-productivity, making them an important feeding and nursery ground for marine species. More than 600 commercially exploited species of fish and other marine organisms have recently been recorded.[47]

61. Currently the livelihoods of about 60,000 – 80,000 artisanal fishermen and their families directly depend on fishing (altogether reportedly more than 600,000 people), Box 4.

Box 4: Fisheries Are Primarily Artisanal and Inefficient

A social assessment of small scale fisheries in Yemen stated that its major traits are: "low levels of income and investment; small amounts of capital and energy; strong dependency on services provided by external agents; strong dependency on seasonality; relatively modest levels of production; and use of simple technology for short fishing expeditions."

The unsustainable operation of the small-scale fisheries is documented by generally declining catch and catch-per-unit-effort, increased effort and fishing ranges, declining size-at-catch, and by certain target populations being on the verge of collapse, as e.g. reported for sharks and sea cucumbers.

Source: Bonfiglioli and Hariri (2004): Small-scale fisheries in Yemen: social assessment and development prospects The World Bank, Washington.

62. Fish are the third of Yemen's important common property resources. Landings of all species have increased from an estimated 77,000 t in 1990 to around 256,000 t in 2004 with an estimated value of US$ 668 million at point of sale. Yemen's main target fish stocks (currently rock lobster, cuttlefish, shrimp, bottom-dwelling finfish species, large pelagics and sharks) are estimated by the World Bank to potentially yield close to US$ 95 million worth of fish annually, of which about 50% could be exported.

63. According to FAO data, and unpublished data of the MFW, fish production has slumped sharply. The annual average growth rate of the fishing fleet is about 12.2%. The number of boats has more than tripled over a period of ten years since 1997 and approximately 29,000 domestic crafts are believed to be operating in Yemen's waters plus an additional 2,000 on the Socotra islands. It is highly likely also that in response to population growth in the coastal zone that fishing efforts will continue to grow.

64. In spite of the high potential of the fisheries, the large and unique ecosystems which sustain it remain understudied to date and require more scientific attention. Biodiversity data are insufficient, fisheries data are lagging even more dramatically behind, and virtually nothing (with few exceptions) is known about the fisheries biology of most of the exploited species: this relates especially to stock assessments, reproductive ecology (e.g. spawning periods and areas, nursery areas, recruitment), viable population sizes, and sustainable catch levels. The majority of recent studies conducted on the fisheries sector in Yemen conclude that sound fisheries management is virtually absent and that stock assessment data are of insufficient quality to justify the current exploitation levels and the continued investment into increased fishery efforts.

65. The fisheries sector has the potential to contribute very positively to the economy, but also very negatively to the development of the coasts. If it is to contribute positively, sustainable fisheries management will have to be implemented with no further delay. Fisheries management in tandem with increased biodiversity conservation efforts and improved spatial planning will be a core pillar of any coastal zone management framework. Initial planning to achieve this has begun.

47. Bonfiglioli, A. & Hariri, K.I. 2004. Small-scale fisheries in Yemen: social assessment and development prospects. The World Bank, Washington.

Aquaculture

66. Aquaculture is widely considered as a new economic opportunity in Yemen fisheries. Only one site (at Loheiyah in the Red Sea) is operational but nine more, primarily for shrimp rearing, are currently being planned or built in the Red Sea. Some are quite large, and most are located in or near mangrove stands and intertidal swamp areas. Given the land alteration and potentially negative effects on the surrounding ecosystems, understanding their environmental impact and designing mitigation measures will be particularly important. This will make the Environmental Impact Assessment (EIA) and licensing prior to the start of construction activities of crucial importance.

Ports and Harbors

67. The development of Yemen's ports should be planned in close coordination and as integral part of coastal zone management activities. Important considerations are the connections to the hinterland and impacts to nearby coastal ecosystems. Under current planning each coastal governorate intends to establish or expand a cargo port. Whether all of them can be profitable given Yemen national economy should be studied carefully.

The impact of climate change will be substantial

68. Yemen's long coastline makes it one of the most vulnerable countries to climate change and sea level rise. The Intergovernmental Panel on Climate Change ranked the Yemeni port city of Aden sixth among globally twenty-five cities most vulnerable to rising sea levels. Impacts may include coastal erosion; destruction of coastal infrastructure and marine habitats; and the elimination of the coastal wetlands in low-lying areas. Higher seawater temperature will modify marine habitats, their biodiversity and fisheries potential.

69. Climate change will affect the coastal zone in three ways. First, sea level rise will require adaptation of infrastructure in ports and towns and related support services such as transport, water supply and sewerage networks. Erosion may also adversely affect ecological and cultural assets. Second, populations migrating from the water-short hinterland will require new industrial and commercial infrastructure to generate employment whilst continued high density residence in the highlands may require construction of desalination plants. Fourth, and finally, increased population pressure will increase the demand for natural resources – raw materials for construction and increased utilization of marine resources and fisheries.

70. Sea level rise will affect a significant portion of the population and productive assets. Main effects will be increased flooding risks, structural damage and contamination by sea water and coastal erosion. The EPA year 2000 study estimated that 24 % of the Hodeidah population and families are expected to be affected by the sea level rise.[48] In contrast, given its unique physical setting, the EPA's 2010 study estimated that about 50% of the populated area of Aden Governorate would be adversely affected.[49] In Hodeidah the potential cost of adapting economic infrastructure to sea level rise was estimated at US$1.3 billion (2000 prices); in Aden adaption costs for a sea level rise two-thirds of that modeled for Hodeidah was estimated at US$2.3 billion (2010 prices.) Sea level rise will exacerbate sea water intrusion into the Tuban delta aquifer and threaten Aden's main source of water supplies.

48. Environmental Protection Council. 2000. Climate Change Impact on the Yemen Coastal Zone: Assessment of Potential Impact of Climate Change on Coastal Zone Areas of Yemen.
49. Environmental Protection Council. 2010. Report on Coastal Zone Vulnerability and Adaptation Assessment, Aden Governorate, Republic of Yemen (As a part of the Second National Communication to the UNFCCC).

71. New industrial and urban development will upset the current equilibrium of the coastal zone. Extensive coastal development, land filling, and coastal engineering will alter coastal areas. Extension of harbors, unless carefully planned has the potential to alter tidal flows that could cause new patterns of coastal erosion and deposition that could adversely affect infrastructure and marine resources. Exhaustion of upland aquifers will probably require construction of desalination plants on the coast that produce concentrated high temperature brine effluents. Increased population pressure may lead to the destruction of coastal mangroves in favor of development of inshore lagoon and pond fisheries have been proposed near Hodeida.

72. Coastal and marine resources are already threatened by development, over fishing, spear-fishing, aquarium fishing and dynamite fishing. These factors also represent major disturbances to the coral reefs of Yemen. Oil exploration and transport have resulted in several oil spills. Sewage discharge, agro-chemicals flushed by floods, and sedimentation from urban development pose further threats to the Red Sea's coral reefs. Recreation and tourism also contribute to eutrophication and reef degradation. Coastal and marine biodiversity, including the Archipelago of Socotra, is threatened by the cutting of mangroves for wood and the use of mangroves for feeding animals, fuel-wood supply and new development projects.

Adaptation Responses in the Coastal Zone

73. The NAPA identifies 22 adaptation options; those of relevance for coastal zone management are presented in Table 3:

Table 3: NAPA Adaptation Options Relevant to the Coastal Zone

• Develop and implement disaster preparedness and recovery programs, including forecasting, early warning systems and rapid response strategies to cope with extreme weather events
• Encourage and expand desalination for drinking water using renewable energy sources, especially on Yemeni islands and coastal areas, where water is unavailable or vulnerable to seawater intrusion
• Develop and implement an awareness raising program on adaptation to the potential impacts of climate change on vulnerable sectors.
• Design and implement watershed management and terrace-rehabilitation programs
• Disseminate flow and flood guidance for stations at main wadis
• Establish a 'National Research Centre' to undertake research on climate change and adaptation issues
• Develop and implement Integrated Coastal Zone Management programs
• Expand green-belts for coastal areas on the main land and islands by planting and replanting mangroves and palms; establish and maintain nurseries that provide cultivars and other materials
• Develop and implement sustainable land management strategies to combat desertification and land degradation
• Establish a database for all climate change related issues including adaptation activities
• Design and implement training and education programs for use of efficient, environment friendly fishing techniques and equipment
• Increase soft protection (e.g., beach nourishment and wetland construction and restoration), and building stone walls to protect from storm surges
• Construct coastal defense and walls for coastal areas vulnerable to erosion
• Improve and activate marine fishing regulatory laws, and engage relevant stakeholders and local communities in monitoring the implementation of valid fishing laws
• Specify fishing seasons for each species of marine resources; issue licenses for definite species

Source: Yemen Strategic Environmental Assessment of Coastal Zone Management, March 2010 (revised June 2010).

74. The coastal belt is becoming the next frontier of development for Yemen. Currently, coastal areas, while vulnerable, are much less stressed currently than the hinterlands and development is sparse except around the three major cities. However, this is rapidly changing and now is the time to proactively address many of the cross-sectoral planning issue and build the knowledge base before development pressures become unmanageable. Adaptation strategies have to include planning to mitigate the risks of exceeding the carrying capacity of the coastal areas given the high reliance on natural resource exploitation for livelihoods and food security, especially of the rural poor. Additionally they will need to consider other threats to the coastal and marine environment such as uncontrolled use of coastal zones, destruction of marine and coastal habitats and ecosystems, spatial conflicts among various users, unplanned coastal reclamation, the destruction of benthic habitats by bottom trawling and the destruction of endangered species.

75. Specific planning interventions that include responsiveness to climate change are:

- *Coordinate all stakeholders concerned with coastal zone management and development;* and develop their understanding of the impact of climate change on their responsibilities and activities. This would include disseminating knowledge on climate change, sea level rise, likely changes in flood flows debouching from wadis onto the coastal plain, and ecological changes along the coast.
- *Enhance local capacities and knowledge needed for climate modeling for the coast of Yemen.* This would be used by decision-makers for the planning of coastal development. Information generated under this component will feed into a future National Climate Information Center through newly-developed institutional linkages.
- *Demonstrate the benefits of a variety of climate adaptation measures through pilot studies.* This could be subsequently replicated and scaled-up in other coastal areas of Yemen. This could include climate- and flood-proofing infrastructures, piloting environmentally desalination and water storage faculties, improving groundwater management to reduce saline water intrusion.
- *Diversify income-generating opportunities.* This would focus on the fisheries sector and development of related processing as well as seeking alternative income sources for coastal communities.
- *Invest in the improvement of ecosystem services.* Mangroves offer protection to the coast, while flood protection also needs to be linked to better watershed management.
- *Develop an integrated plan for coastal zone management.* This would include institutional arrangements for upward linkages to national development planning and downward linkages to municipalities, industries and communities. This could be developed iteratively building on the knowledge generated by the activities listed above.

LANDSCAPES AND BIODIVERSITY

76. The biological diversity of Yemen occurs in a spectrum of habitats ranging from coastal mangroves and coral reefs to the highlands and deserts of the interior. These habitats harbor a great number of unique species of wildlife and domesticated animals and plants. Historically, Yemen was a good example of economical and sustainable use of the available natural resources, where conservation of soil, crops and rangelands were part of the traditional systems, and agricultural terraces were mainly built for conserving water and preventing soil erosion. However, the degradation of watersheds, from mountain ranges to coastal and marine zones in Yemen, in response to population pressure and development, has led to rapid declines in the quality of the environment. Deforestation of upper watersheds, overgrazing, terrace degradation and changes in land use are increasingly threatening downstream areas with floods, erosion, reduced dry-season river flows and sedimentation of irrigation systems dependent and surface

water. The continued loss of water resources, forests, agro-forestry land use systems and desertification reduces biological diversity and ecosystem integrity.

77. In many regions, agriculture is centered on springs whose sustainability relies mostly on the good maintenance of upper terraced areas. Denudation of tree cover and the subsequent erosion of the late 1960s and 1970s effectively removed the capacity of the upper escarpments to absorb the moisture necessary to feed these springs. Even worse, upper catchment erosion often covered these ancient systems with gravel, boulders and soil. Climate change may accelerate these impacts and the adverse domino effects on lower-level terraces and watersheds.

78. Similarly, degradation of terraces and landscapes can affect important landraces.[50] Landraces can still be found in isolated and marginal areas, such as mountains and oases where traditional cultivars are still grown. This is the case of Yemen where some of the important traditional crops such as finger millet (Eleusine crocana) and oil rape (Brassica napus var. napus) are now grown only in very specific areas. These landraces and old cultivars are extremely precious varieties of human food and fodder crops, which are the best adapted to the various environments of Yemeni mountains characterized by droughts and altitudes. Their conservation could be essential for the food security of farmer households living from rain-fed farming in the perspective of climatic change to come. Without their conservation, rehabilitating terraces under pure rain-fed conditions could fail.

79. Fuel-wood constitutes a major source of energy, particularly for rural households. Fuel-wood consumption is estimated to be 3.24 million metric tons of dry wood annually, consisting of 2.8 million tons of firewood, 260,000 tons for commercial charcoal and 173,000 tons for households' charcoal.[51] This level of wood harvest poses serious threats to nearly 19 species of common trees and shrubs, which in turn results in drastic deterioration of rangelands and wood resources. This leads to accelerated wind erosion, sand encroachment, and subsequently desertification associated with a notable decline in agriculturally productive lands in addition to the loss of nurseries of many mammals, reptiles and birds inhabiting harvested areas.

80. Desertification of agricultural land ranges from 3 to 5% per annum, where the area of deteriorated land due to soil erosion is estimated to be 12 million hectares and another 3.8 million hectares due to salinity.[52] Additionally, desertification is further exacerbated by sand dune encroachment. The dependence of rural communities on land for their livelihoods means the adverse effects of the deterioration of land resources and desertification affect rural populations more than the urban populations.

81. Eco-tourism. Yemen is characterized by many landscape and cultural features that make it a destination for tourists from all over the world. Properly facilitated it could significantly add to the rural economy. For millennia, the people of Yemen have been known for their sophisticated systems of agricultural terracing, rational use of arid rangelands, sustainable fishing practices along the country's extensive coastline and their unique architecture and town planning. Highly developed ancient cultures existed as far back as the 7th Century. UNESCO has declared three ancient Yemeni cities (Sana'a, Zabid and Shibam) as World Cultural Heritage Sites. Yemen's unique biodiversity, particularly on Socotra, attracts eco-tourism.. The National Environment Action Plan (NEAP) emphasized the importance of ecotourism, especially in the Socotra Archipelago and along the thousands of kilometers of coastal areas, which extend along the Red Sea, Gulf of Aden, and the Arab Sea.

50. FAO. 1995. Sub-regional Synthesis report from the FAO International Technical Conference on Plant Genetic Resources held in Teheran for West and Central Asia countries.
51. FAO yearbook on forest products, 1995.
52. Source of information: Poverty Reduction Strategy Paper (PRSP), 2003-2005.

The effect of climate change on biodiversity is uncertain

82. Climate change specialists predict that a more arid climate would be likely to result in further desertification, with increases in semi-desert and desert areas, along with significant declines in wetland areas. Such changes are likely to have important consequences for plants and animals with specific or restricted distributions, and such species may face increased risks of extinction.

83. Information on the vulnerability of landscapes, watersheds and terraces to climate change is still lacking and climate change is only now emerging as a national development priority for the Republic of Yemen. There is growing government endeavor to integrate climate change issues into national development planning through the development of the National Adaptation Programme of Action (NAPA) that will facilitate participation of NGOs, the private sector, community organizations and government agencies whose role is expected to minimize the costs and enhance the efficiency of climate change adaptation. Major obstacles, for example, to adaptive management of watersheds are:

- Lack of information on their vulnerability to climate change;
- Inadequate systems and technical skills for watershed management and their regulation at national, governorate and community levels; and
- Unclear mandates of agencies involved in watershed management and fragmented and non-participatory planning and management.

Adaptation Response

84. Three approaches are suggested. First, survey and categorize landscapes and biodiversity on a watershed basis to identify those most critically threatened by climate change. Second relearn traditional natural resources co-management with agriculture. Third, promote ecotourism to heighten awareness of the uniqueness of Yemen's landscapes and biodiversity and thus provide external support to the rural economy.

85. The focus of watershed conservation and management needs to be enlarged to include an ecosystem approach. Current pilots focus primarily on local institutions for water management. This needs to be enlarged to include ecology and agrobiodiversity to ensure an integrated approach. It also needs to be on sufficiently large scale to include whole ecosystems so that critical habitats are preserved.

86. Traditional and sustainable natural resources management skills need to be relearned. The legal protection and enhancement of traditional and indigenous knowledge, and skills and the improvement of people's attitude and participation for the conservation and the sustainable use of biodiversity and related natural resources, are very important steps towards rehabilitation of the natural resource base and man-made agricultural, pastoral, and fisheries systems. Rekindling traditional knowledge and skills will be a process of re-learning, testing and adaptation of sometimes forgotten systems to the present day situation. Stakeholders may need to be convinced of the advantages, economy and rationality of looking to the past to help guide the country's future development. And efforts to ensure the participation of communities will be key to successful adaptation.

87. A comprehensive national tourism policy including rural areas needs development. This would set goals for the sector, establish coordination mechanisms among all institutions involved in the sector, establish standards to be followed when developing tourism projects, define the concept of eco-tourism in the Yemeni context, and determine areas most suitable for eco-tourism. Clearly eco- and cultural-tourism has a high potential for public-private partnerships and it could be a source of significant employment generation that would bolster the rural economy.

88. Aware of the importance of eco-tourism and its potential for Yemen, the General Tourism Authority established, in cooperation with EPA, a department of eco-tourism. In 2002, the department was shifted to the Ministry of Culture and Tourism that has continued to receive support from international and bilateral institutions. A draft law on ecotourism is under preparation and it is anticipated that it will consolidate all the existing and proposed legislations into one general law governing the sector.

3. PPCR Program Linkage to Existing Development Programs and Plans

The Strategic Approach

89. Yemen plans to mainstream climate resiliency into development planning at the strategic level, along with a 'knowledge response' and introduce adaptation measures to the risks and opportunities posed by climate variability and change. The development objective is to improve institutional capacity at local and national levels to address climate change risks and increase resilience of communities to climate change impacts. To achieve this the focus of the SPCR is on three pillars:

- *An integrated cross-cutting approach to mainstream climate resilience*
- *Knowledge generation and management*
- *Implementing adaptation measures*

90. The previous chapter described the high degree of uncertainty regarding the future of Yemen's climate, but it also highlighted that certain adaptation options would be appropriate whatever the emerging climate patterns. These options coincide with Yemen's existing strategic priorities for the water and agriculture sectors, cross-cutting concerns for biodiversity and ecological conservation, and regional planning challenges brought about by climate change in the coastal zone.

91. Yemen's strategic approach to climate resiliency is a partnership between government, the Yemeni people and international partners. It plans to mainstream and climate-proof ongoing or planned programs and projects, while also building on and enhancing elements of climate resilience that are already part of ongoing projects. The whole approach of building on or supplementing existing and planned projects and programs is to create synergy, reduce duplication, and bypass the need to develop new project implementation agencies, thus improving institutional efficiency and enabling quick-starting initiatives.

The National Adaptation Program of Action

92. Yemen submitted its NAPA in 2009, as the final result of a very comprehensive country-wide consultation process. The aim of the process was to address the adverse impacts and threats of climate change, and indentify and develop the most urgent and immediate adaptation needs. The consultation process included local communities and vulnerable groups such as women, farmers and fishermen, public representatives, academia and research institutions, and NGOs. The outcome was the identification of seven vulnerable areas grouped into 7 thematic areas, Table 4.

Table 4: Summary of The Main Vulnerable Sctors in Yemen

Sectors	Major Vulnerabilities
Water	Water availability and quality difficult situations due to changing patterns of rainfall, impact directly on the livelihoods of the communities. Groundwater sources are at risk from sea level rise induced sea water intrusion.
Agriculture & Food Security	Drought, temperature variability, and changes in precipitation regime can lead to disastrous consequences for agriculture and food security. Climate changes may imply degradation of agricultural lands, soils and terraces, desertification, which negatively affects agricultural incomes for local communities and leads to national food insecurity as food production levels change.
Biological	Frequency in drought, temperature fluctuation, and changes in precipitation patterns due to climate change,

Diversity	will lead to the deterioration of and changes in the habitats of endangered and endemic species. The intense wave activity of storms already damage near shore coral reefs in the Red Sea and Gulf of Aden, as sea levels rise and storms become more frequent Yemen may see an increase in intense wave activity.
Coastal areas Communities	Flooding of low-lying areas and coastal erosion threaten local communities and their livelihoods. Communities may experience damage to household assets and property, constraints on services such as water supply and quality, and damage to agriculture.
Coastal environment/ infrastructure	Deterioration of wetlands, mangrove forests along the shoreline as well as in islands in the Red Sea. As a result of sea level rise, Yemen can expect damage of infrastructural assets in coastal cities as well as to cultural heritage assets.
Health	Changes in climate will create more suitable conditions for the occurrence and spread of vector borne and water borne diseases such as malaria.
Tourism	Impacts include loss of beaches, degradation of coastal ecosystems, saline water intrusion, damage to infrastructure, and coral reef loss and bleaching.

Source: NAPA. 2010. Table 3.1

93. The prioritization of adaptation projects involved two major steps in the Yemen NAPA process. First, a number of evaluation criteria were locally determined through the stakeholder consultation process. Then, through a scoring, weighting, and ranking process – part of a multicriteria analysis –a discrete set of prioritized adaptation activities were developed for each ecological zones, and for each priority sectors. The initial list of 95 interventions identified was then narrowed down to 22 options. These were then prioritized after considering how they could be integrated into the national planning process, and reduced to four priority thematic areas, Table 5.

Table 5: Summary of NAPA's Ranked Set of Priority Adaptation Options

Sectors	Adaptation Activity
Water	Rainwater harvesting through various techniques including traditional methods. Water conservation through reuse of treated waste water and grey water from mosques, and irrigation saving techniques.
Agriculture	Rehabilitation and maintenance of mountainous terraces. Promotion of research on drought resistant and heat- and salinity-tolerant crops. Development and implementation of sustainable land management strategies to combat desertification and land degradation.
Coastal Zones	Planting and re-planting of mangroves and palms for adaptation to sea level rise. Coastal zones sustainable management of fisheries resources. Development and implementation of Integrated Coastal Zone Management Programs.
Cross-Sectoral	Implementation of an awareness- raising program on adaptation to the potential impacts of climate change on vulnerable sectors Development and implementation of programs to improve Yemen's preparedness to cope with extreme weather events. Establishment and maintenance of a Climate Change Database

Source: NAPA. 2010. Table 3.2

Links to National Policies and Sector Strategies

94. Yemen's 4th Five Year Socio-economic Development Plan for Poverty Reduction 2011-2015 recognizes the country's vulnerability to climate change, Box 5.

Box 5: Climate Change is Recognized in Yemen's Development Plan for Poverty Reduction (DDPR)

Yemen is particularly vulnerable to the effect of climate change because of the role of agriculture and fisheries sectors in the economy and the livelihood of many people, the extreme water scarcity, and its long coastline with fragile marine ecosystems. Its poverty and institutional weaknesses also limit its capacity to adapt. Extreme weather patterns and the effect of a rising sea level can cause health impacts and outbreak of water-borne diseases, seriously affect availability of water, reduce harvests and food security, and threaten fisheries by causing damage to the coastline and disrupting ecosystems.

The government is aware of the threat of climate change to the country's development, but its capacity to deal with it is limited. It has established an Inter-Ministerial Committee on Climate Change, developed the National Adaptation Program of Action (NAPA) and is participating in the Pilot Program for Climate Resilience (PPCR). The Environmental Protection Agency (EPA), which has a climate change unit, is responsible for managing the government's actions on climate change.

Three areas are most vulnerable to the adverse effects of climate change. Both rain-fed and irrigated agriculture will suffer from extreme weather patterns and the variability in rainfall. Coastal areas have a wealth of natural resources that are delicately balanced. A rise in the sea level could cause floods and erosion, disrupt fragile ecosystems and cause salt water to contaminate groundwater. The present water scarcity could be aggravated by droughts and hotter weather and a change in rainfall patterns.

The DPPR includes a major investment and other actions to deal with the threat posed by climate change. The PIPIt includes a US$81 million project, the 'Strategic program for Climate Resilience and Disaster Risk'. The government plans to prepare and implement a national plan to preserve the marine and coastal environment. It also intends to build a national environmental database available to all concerned agencies and to strengthen institutions and complete the legal and regulatory framework for adapting to climate change and protecting the environment.

Source: 4th Five Year Socio-Economic Development Plan for Poverty Reduction 2011-2015.

95. Climate change, with its ongoing and cross-cutting implications for water security, food security, disaster risk management and social protection, has the potential to undermine gains made in meeting poverty-reduction efforts and specific sectoral development challenges. It will therefore require particularly careful consideration under the 4th DPPR and beyond to place Yemen on a path to climate-resilient development. Existing sector strategies affirm the relevance of the NAPA's prioritization of adaptation activities and the PPCR.

NATIONAL WATER SECTOR STRATEGY

96. The Yemeni government is aware of the challenge that the country's water problems pose for water supplies and achieving food security, and has taken some significant institutional steps over the past years. Strategic planning began in the early 1990s. In 1996, the National Water Resources Authority (NWRA) was created to implement an integrated approach. A water law was enacted in 2002, and in 2003 the Ministry of Water and Environment (MWE) was established. MWE prepared a consolidated strategy, action plan, and an investment program for the water sector as a whole the National Water Sector Strategy and Investment Program 2005-2009 (NWSSIP), adopted and published by the government in 2004. In late 2007, the Yemeni government decided to prepare an update of NWSSIP 2009-2015 to adjust policy and program measures, and particularly focus on incorporating irrigation more fully into an integrated water resource management and regulatory framework. The total base costs of

NWSSIP 2008-2015 was estimated to be US$3.2 billion of which 46% would be for the urban water sector and about 26% for rural water supply, the balance for water resources management and irrigation.

97. The NWSSIP strategy aims at recovering control over the groundwater resource and moving Yemen towards the Millennium Development Goal (MDG) targets for water supply and sanitation. Key elements are strengthening the institutional basis for regulating water rights and use; developing a decentralized partnership approach to water management at the basin and local levels; supporting water user associations as the basic building blocks of water management at the lowest level; and investing in irrigation modernization; and using economic instruments for demand management. In addition, a business-like approach to urban service delivery is envisaged through the separation of regulatory functions from service delivery and the decentralization to autonomous local utilities. Finally, the strategy suggests that efficiency gains can be achieved through partnerships with the private sector. To achieve the overall goal, NWSSIP includes four subsector programs: Integrated Water Resource Management (IWRM), Urban Water Supply and Sanitation (UWSS), Rural Water Supply and Sanitation (RWSS), and Irrigation and Watershed Management (Irrigation). These subsector programs are fully-supported by the international development partners (as stated in Annex 3 of the 2010 PPCR Phase I Proposal for Yemen).

98. Both the WSSP and NWSSIP concur that decentralization of authority over water management will be an important component of the effort to increase resiliency of the sector. In particular, increased decentralization of the role of the National Water Regulatory Authority (NWRA) has been encouraged under both of those strategies.

99. The call for a decentralized approach has recently been echoed by a broad coalition of government and civil society organizations. In January 2011, representatives of the Government of Yemen and civil society held a National Conference on Management and Development of Water Resources.[53] The result of this conference, the Sana'a Declaration on the Yemeni Water Partnership, urges a more partnership-based approach, with greater decentralization of authority, integration of water planning, and conservation measures. Although the Sana'a Declaration does not mention climate vulnerability or climate change specifically, its recommendations are important because the measures it proposes will help to improve the resiliency of the water sector overall.

100. Devolution of water management authority to the level of the communities, WUAs, and the drainage basin is expected to improve effectiveness in managing the resource because it places the capacity to act closest to the resource itself and to its users. This in turn makes it possible to harness local knowledge and increase participation of communities in the management of the resources on which they depend.

AGRICULTURE SECTOR STRATEGY

101. The current agricultural strategy – the Aden Agenda – is focused on removing the major constraints to increasing food security. The Agenda recognizes that adaptation to climate change is important. The agricultural strategy for Yemen was compiled by the Ministry of Agriculture and Irrigation's (MOAI), General Directorate of Planning & Monitoring in 2000. Despite the fact that this strategy document is a decade old, many of the objectives, constraints and policies it identified remain relevant today. In addition, the following summary adds comments from representatives of the Ministry of Agriculture and Irrigation (MOAI) as reflected in the minutes of the National Food Security Workshop from June 7, 2009 (MOPIC, 2009).

53. Yemeni Water Partnership. (2011). The Sana'a Declaration on the Yemeni Water Partnership. National Conference on Management and Development of Water Resources in Yemen. Sana'a, January 17, 2011.

102. The Aden Agenda states that the overall objective of the agricultural sector is to contribute to national development through higher levels of food security that will help in combating poverty. Major constraints identified by the Aden Agenda that prevent agriculture from fulfilling this role are:

- *General policies:* Bias against agriculture in domestic trade policies (tariffs) and underinvestment in the sector relative to its share in the economy;
- *Natural conditions:* Increase of desertification and natural disasters such as droughts and floods, which is likely to be exacerbated by climate change in the future;
- *Production:* Low productivity of farmers and farming systems due to sector-specific problems (such as use of inefficient technologies, unsustainable water use, lack of access to credit) and general constrains (such as inadequate infrastructure, lack of education, poor health and nutrition, use of qat); and
- *Governance:* Inadequate legal framework, poor law enforcement and application.

COASTAL ZONE MANAGEMENT STRATEGY

103. Integrated Coastal Zone Management (ICZM) is a relatively new concept for Yemen. In Yemen, there are approximately 50 different legal and regulatory provisions that range from national to local coverage, which have a bearing on CZM. Several key laws relevant to CZM are currently under revision and due for endorsement; for example, the Environmental Law, the Fisheries Law and the By-Law for the "State Land Authority" (GALSUP). An Aden ICZM Decree (from 2005), which defines the entire governorate of Aden as its mandate area, prescribes certain management objectives and stipulates a coordination mechanism between the governmental agencies involved in planning and management. Importantly, the Decree was extended in 2009 to the remaining eight coastal governorates, providing an opportunity to demonstrate ICZM for potential scaling-up. The National ICZM Decree provides a framework for cross-sector coordination and incorporation of climate resilience into development planning and to address key economic sectors.

BIODIVERSITY STRATEGY

104. Development policy in the past 30 years has been focused on short-term objectives that provided immediate economic benefits – groundwater irrigation being a prime example – while the impact of this development process on the environment was ignored. To redress this Yemen initiated planning in 2005 to achieve sustainable development through the development of National Biodiversity Strategy and Action Plan.[54] The vision of the Biodiversity Strategy and Action Plan for Yemen is to achieve a better quality of life for all Yemeni people through the conservation and sustainable use of biological resources and stabilizing resource consumption, while ensuring that these are in harmony with the limits of the carrying capacity of nature and ecosystem integrity.

105. The Biodiversity Strategy developed an Action Plan which included development of (a) protected areas, (b) an Integrated Coastal Zone Management Plan (ICZMP, (c) Policies, Legislation and Regulations on Biodiversity Issues in Yemen, (d) Essential Measures for the Conservation of Agro-biodiversity in Yemen, ((e) Reviving Traditional and Indigenous Knowledge in Natural Resource Management Systems, (f) National Biodiversity Education and Awareness Program and (g) Regulations and Guidelines for Biosafety. The Action Plan requires mobilizing the resourcefulness of the Yemeni people and utilizing international technical and financial support.

54. Republic of Yemen. 2005. National Biodiversity Strategy and Action Plan. Ministry of Water and Environment Protection Authority (EPA). UNDP/GEF/IUCNYEM/96/G31.

FISHERIES

106. The fisheries sector is currently the subject of substantial reform activities, notably by the World Bank and European Union-led Fisheries Resource Management and Conservation Project (FRMCP). FRMCP, which closes in September 30, 2012, aims to strengthen the sector's governance through an institutional restructuring process. The EU-funded Yemen Fisheries Support Programme and the pipelined IFAD Fisheries Investment Programme are expected to complement these efforts by promoting stock assessment of fishery resources, fisheries monitoring and information systems, and fisheries management. Finally, a recent initiative of the multi-donor South-South Experience Exchange Trust Fund, the Yemen and China Knowledge Sharing on Systematic Management of Coastal and Marine Areas in Yemen, has brought practical inputs from the Chinese fisheries sector to Yemeni stakeholder from central and local authorities, the Fisheries Cooperative Union and the private sector.

4. Rationale for PPCR Support

Value added of the PPCR Process

107. Development planning in Yemen has been driven by the imperative to meet the immediate needs of its population for food and the essentials of life, and this has left little room to address longer-term concerns about climate change and the sustainability of current natural resource use. A substantial part of the population depends on natural resources that are rapidly being depleted, and Yemen cannot continue on its current development path without jeopardizing any prospect of sustainable development that is essential to achieve poverty alleviation and a better quality of life.

108. The PPCR investments will add value by building climatic resilience and ability adaptation into the water and agricultural sectors, as well as the coastal zones that are considered to be the three areas most at risk. Because of the interconnected nature of these critical sectors of the economy, changes in climatic variables will bring accompanying variations in the biophysical underpinnings of the economy, with corresponding knock-on effects that will ripple outward through the entire society. The interlocking problems of water and agriculture are expected to have serious implications for food security in a country that already imports a significant proportion of its foodstuffs. By focusing attention on the growing importance of the rainfed agricultural sector and the ecological system on which it is linked, the PPCR will augment current agricultural production planning that does not take into account future climate change. Similarly, the DPG's focus on a quick resolution to the problem of groundwater regulation should have considerable benefit to sustainability of irrigated agriculture in Yemen.

109. The PPCR process has also a number of institutional comparative advantages. The location of the Project Coordination Unit (PCU), which will support also the Technical Secretariat to the Inter-Ministerial Committee for Climate Change (IMCCC), in the EPA gives it a cross-sectoral strategic overview that considers all resources and landscapes likely to be affected by climate change. The PPCR has already facilitated the creation of the IMCCC to take the lead on integrating climate resiliency in government planning and programs. And through the same process, the PPCR will attempt to bring coherence to hydrometereological data gathering to ensure more harmonized and results-oriented analysis, forecasting and services. This will be technically executed by the Civil Aviation and Meteorology Authority (CAMA), which is the national agency that represents Yemen within the World Meteorological Organization. Importantly, the PPCR provides a channel for an integrated and cooperative risk management approach for both top-down and bottom-up initiatives. For example, the Technical Assistance (TA) on climate information systems both develops the capacity of national institutions to model and predict changes in climate, manage disaster risk, and contributes to the ability of local communities to monitor and understand the changes in their own climate.

110. The PPCR process will enable knowledge generation of human and ecological adaptation to climate change in a number of diverse areas of Yemen and provide a framework to integrate this knowledge to regional and national levels. It includes development of permanent mechanisms for stakeholder participation from the local to the national level. For example, the role of Community Service Organization (CSOs) on the Technical Advisory Group. This scaling-up of local knowledge may bring important adaptation knowledge to sector-wide programs such as the WSSIP, or enable, for example, transfer of knowledge from one part of the coastal zone to another, or better design of future projects. In addition, the PPCR process will probably enhance the development effectiveness of the existing programs and projects through which it is implemented.

111. In the immediate short- to medium-term, PPCR support will be instrumental in helping Yemen to make the transition to these climate change resilient pathways. It makes explicit the need to incorporate climate resilience measures in strategic development planning now (starting with the 4th DPPR) and in the future. It includes policy measures which change the enabling set of incentives across institutions in critical sectors (water, agriculture, disaster risk management).

112. It will allow the testing/piloting of specific innovative investments. Its consultative nature is unprecedented. It will facilitate civil society's voice into local, regional and national decision-making. Each of the interventions has the potential through the pilot stage to be further scaled-up. For example, the SPCR project Improving Rural Livelihood through Adaptation in Rain-fed Agriculture (INLARA) which would receive $30-$50 million, can only be implemented across a limited number of governorates. In time, with further funding, successful interventions can then be extended to the remainder of the country as appropriate.

WHY WAS THE PPCR SUPPORT REQUESTED?

113. Yemen is resource-constrained in terms of IDA funds. There are high-level and competing systemic issues which need to be addressed for which scarce IDA funds have already been earmarked (e.g. civil service reform). However, the Government is also committed to recognize and address climate resiliency. Thus it has agreed to go beyond the PPCR grant threshold to seek concessional financing so that it will have available the full scale of resources necessary to realize the necessary transformations.

WHAT IS THE POTENTIAL COST EFFECTIVENESS OF THE PROPOSED INVESTMENTS?

114. The PPCR will capture economies-of-scale by combining with and scaling-up existing initiatives and institutions. There is strong complementarily between funds to be allocated under PPCR and existing and planned investments. For example, the reforms proposed under the $25 million planned Development Policy Grant (DPG) will act as enablers to permit faster and more complete achievement of the goals of the $300 million WSSP. Similarly, the IRLARA project will allow Yemen to climate-proof and scale-up the interventions in the Rainfed Agriculture Project (RALP) and Groundwater and Soil Conservation Project (GSCP). The PPCR funding for the coastal zone will leverage the $4.5 million from the Least Developed Countries Fund (LDCF) to target a broader range of interventions across a wider geographical area.

HOW IS IT SUSTAINABLE?

115. The PPCR interventions will enhance environmental sustainability. Examples: water systems, ecosystems having a better balance, terraces building resilience, etc.

116. In terms of the sustainability of the development outcomes, climate resilience is a "learning by doing" experience. The PPCR does not pretend to have answered all possible questions of sustainability, but will adopt an adaptive approach.

117. At the financial level, in the short term, there will be a need for incentives to be provided, particularly at the community level and requiring an inflow of funds.

118. In terms of institutions, capacity-building will be an ongoing process at national, governorate and local levels that will require financial support for a certain time until a reasonable critical mass of capacity and of knowledge has been created, inter-linked and is self-sustaining.

5. Institutional Analysis

Present Institutional Structure

119. The Environment Protection Authority (EPA)[55], an implementing entity under the Ministry of Water and Environment, has been over several years Yemen's focal point on issues relating to climate change. The EPA is entrusted with a wider environmental mandate, including providing support in the formulation of environmental policies, strategies and action plans, drafting and implementation of program and projects, drafting of environment-related laws and by-laws, provision of technical feedback and advice on regional and global environmental conventions. With Yemen's ratification of the United Nations Framework Convention on Climate Change (UNFCCC) on February 21, 1996, the EPA[56] was mandated as the UNFCCC National Focal Point. The EPA includes a Climate Change Unit which has taken the lead in the coordination and development of the Initial National Communication to the UNFCCC (2001) and is presently preparing the Second National Communication to the UNFCCC. The EPA also took the lead in the development of the National Adaptation Program for Action (NAPA), which was finalized with the endorsement of the document by the Cabinet in June 2009.

120. A number of programs and projects involving national consultations on climate change,[57] revealed weak institutional capacity and fragmentation of institutional responsibility for climate related data collection, management and climate change response measures. It is important to strengthen cooperation among agencies and to streamline climate change into the operational activities across all line-Ministries.

121. The Phase I proposal supports an assessment of the institutional capacity of key line agencies to carry out their mandates including detailed analysis of technical skill needed, staffing patterns of the respective ministries and their capacities to plan, develop, and facilitate implementation of policies and activities that contribute to building resilience to climate change in Yemen. For first results assessing the mandates of key institutions, reference is made to Table 1 in Annex 1.

122. The GoY has established the Inter-Ministerial Committee for Climate Change (IMCCC) which was approved by the Cabinet on November 10, 2009 (Cabinet Decree No. 349; Annex 1) in an effort to strengthen institutional capacity related to climate change. A key driving force for the establishment of the IMCCC was the PPCR process. The IMCCC reflects the GoY strategic institutional framework that adaptation initiatives need to be implemented as part of a broader set of actions within Yemen's existing development processes, decision cycles and institutional arrangements. The IMCCC, is a Sub-Committee of the Cabinet, and is chaired by the Deputy Prime Minister and constitutes of the following members as outlined in Table 6; a summary of its mandate can be found in Box 6.

123. The IMCCC is supported by a Technical Committee which entails representatives from related agencies and provides technical support, such as preparing technical reports and documents regarding climate changes related activities in different sectors, and data collection from different sectors to be utilized in the preparation and implementation of climate change adaptation programs and activities.

55. Decree No. 99/2000

56. The Environment Protection Council established in 1994 was transformed into the EPA in 2001.

57. For example: Initial National Communication to the UNFCCC; National Capacity Self Assessment (NCSA, 2007) to assess the capacity of the country at the individual, institutional and systemic levels to address issues and obligations related to the UNCBD, UNFCCC and UNCCD; and the National Adaptation Program of Action - (GEF/UNDP).

Table 6: Inter-Ministerial Council for Climate Change - Membership

1	Deputy Prime Minister/Minister of Planning and International Cooperation	Chair
2	Minister of Water and Environment	Vice Chair
3	Minister of Finance	Member
4	Minister of Agriculture and Irrigation	Member
5	Minister of Oil and Mineral Resources	Member
6	Minister of Transport	Member
7	Vice Minister of Local Administration	Member
8	Minister of Telecommunications and Information Technology	Member
9	Minister of Fish Wealth	Member
10	Vice Minister of Planning and International Cooperation	Member
11	Chairman of the Environment Protection Authority	Member
12	Chairman of the Natural Water Resources Authority	Member

ROLES OF EXISTING INSTITUTIONS

124. The EPA is mandated to host the Technical Secretariat to the IMCCC, and coordinates the activities of the IMCCC. It is the main interlocutor to ensure communication with all national agencies in regards to climate change. Overall, this shows a first but strong political commitment, beyond the traditional entities (like the Ministry of Water and Environment and the Environment Protection Authority) for coordinating and nurturing mainstreaming of climate resilience into the overall development planning for Yemen. Since its inception, the IMCCC has provided important guidance regarding the institutional arrangements for climate change. The IMCCC was also instrumental in establishing and providing overall guidance and support to the Climate Change Negotiation Team which lead the climate change dialogue up to and through the CoP16/MoP16[58] meetings in Cancun in 2010 when the GoY was chairing the Group of G77 and China.[59] The IMCCC meets on a regular basis, and provides strategic guidance to ensure that both the PPCR and climate agenda receives the highest level of political attention. An outline of roles and responsibilities of key institutions can be found in Annex 2.

Box 6: Inter-Ministerial Committe on Climate Change - Mandate

Pursuant to Article 7 of the Cabinet Decree No. 349, the primary activities of the IMCCC are:

- Supervision on climate changes related activities and programs;
- Coordination of climate changes related activities and guarantee their integration with activities in different sectors;
- Inclusion of climate changes related issues in the national strategies and plans, as well as in the sectoral strategies and plans;
- Review and approval of projects and programs annual documents in the climate changes area;
- Conduct monitoring and evaluation for activities and programs in the climate changes area;
- Coordination and cooperation with donor states and organizations regarding climate changes related activities and programs.

TECHNICAL AND INSTITUTIONAL ISSUES REQUIRING ATTENTION

125. Despite climate change gaining greater political attention in Yemen, fundamental challenges remain. As already pointed out in the National Capacity Self Assessment Study,[60] inadequate institutional capacity to address the impacts of climate change and poor coordination management among concerned

58. Conference of the Parties and Members of the Kyoto Protocol (UNFCCC/Kyoto Protocol).
59. Conference of the Parties and Members of the Kyoto Protocol (UNFCCC/Kyoto Protocol).
60. Ministry of Water and Environment (2007): National Capacity Self Assessment Project – Cross Cutting Analysis Report (developed in cooperation with GEF/UNFP).

agencies are some of the underlying causes. Other capacity constraints identified, include:

- Limited understanding of the implications of climate change on sustainable development;
- Lack of a well operating national system for acquiring, managing and assessing data on meteorology and hydrology that has severe implications for being able to assess near and longer term climatic trends, and limited access to climate change information;
- Missing approaches for integrating climate adaptation into development policies at national, sectoral and project levels and in urban and rural contexts;
- Existing policies and legal frameworks need to be strengthened to address climate change risks;
- Weak capacities in preparation of plans, programs and projects;
- Low awareness of the public and private sectors on the adverse risks and impacts of climate change;
- Overlapping and/or unclear mandates amongst different entities;
- Weak community awareness and weak extension activities;
- Inadequate personnel in government, academia and the education system who are trained in climate science and related disciplines;
- Limitations in training programs and lack of adequate financial resources to implement climate change risk management and disaster risk reduction measures;
- Limited observation data on the meteorological and hydrological parameters to support early warning systems and the identification of appropriate adaptation measures at the community level;
- Limited understanding of the key socio-economic vulnerabilities, the consequences of climate variability and change to the key sectors of the economy and scope for potential adaptation measures;
- Weak scientific and technical cooperation and exchange of information.

126. More work is needed to integrate adaptation into provincial level policy, planning and budgeting processes. There is urgent need to address climate risks and enhance technical capacity needed to integrate adaptation to climate change into governorate planning processes. Limited budget resources do not meet even current priority development needs or the cost of adaptation, including provision of training and capacity building at governorates or local council levels to address this challenge.

127. Investments proposed under the SPCR will provide much-needed institutional support. This would:

a) Strengthen the capacity of key stakeholders;
b) Improve coordination among engaged agencies and within existing mechanisms for mainstreaming climate change resilience into development planning;
c) Review, and adjust and update relevant regulations and standards to reflect climate change impacts; and
d) Improve quality and availability of climate data and information to inform decision-makers. and to guide adaptation and monitor implication which should be based on best available information. This will involve improving the coverage and quality of climate monitoring data and using multi-model ensembles to fill the gaps and define the level of associated uncertainty. Availability of better quality data will translate into actions though scientific analysis, knowledge development and capacity building.
e) Develop guidelines on using climate data from national to local level to prepare stakeholders in developing climate adaptation strategies, and

f) Establish monitoring of the use of climate data, and gain feedback to improve ease of access and application.

128. Adaption activities will require a variety of disciplines and stakeholders and should be based on collective actions by engaged institutions. Several key institutions have a role in managing climate change risks in the country, complimented by a range of private and civil society stakeholders as well as the academia.

129. Importantly, the SPCR would support a framework and mechanism for coordinating activities across different levels of governance. This would strengthen capacity and demonstrate approaches to integrate climate resilience into development policies and planning while adhering to the existing institutional framework.

6. Outline of the Strategic Program for Climate Resilience

The Proposed PPCR Investment Program

130. Yemen's challenges in terms of climate change are tremendous and call for a broad set of interventions. The NAPA had identified an extensive list of short term interventions that would be needed to address immediate and urgent needs. Different development partners have already stepped in to some of these proposed interventions. The SPCR, on the other hand, focuses on longer term interventions aimed at enhancing climate resilience in Yemen. The SPCR cannot address all of the key risks that have been identified, but aims to address the highest priority risks identified during the preparation process and through consultation with vulnerable communities.

The Proposed SPCR and its Components

131. While many areas of Yemen's economy are likely to be affected by climate change, few sectors have either developed or acknowledged the need to develop adaptation strategies. Water, agriculture, coastal zone management and biodiversity are notable in recognizing the imperative to respond to climate change and are receptive to assistance to build their adaptability. Consequently, the SPCR plans to focus on these sectors that have cross-cutting themes where there is the highest likelihood of stakeholders buying into the PPCR process.

132. Following discussion of the NAPA proposals with stakeholders in late 2010 and the spring of 2011, it was agreed that a coordinated set of investment activities would be required to address the challenges that climate change will impose on Yemen. Four investments are proposed for implementation through Yemen's SPCR, Table 7:

Table 7: Proposed SPCR Investments

Investment	*Type and Amount of Funding*
1. **Climate Information System and PPCR Program Coordination.** This would support: (a) National network of hydro-meteorological stations; (b) Human and institutional capacity-building; and (c) Weather, water and climate information services for program management and knowledge sharing in agriculture, food security, water management, etc. and d) PPCR Program management.	Technical Assistance/Investment Project US$19 million Grant funding.
2. **Improving the Climate Resilience of the Water Sector.** This would support: (a) Building a strong policy framework and responsive and capable institutions which implement integrated cross-cutting approach to mainstream climate resilience in the water sector; and (b) Implementing adaptation and mitigation measures at the watershed level.	Development Policy Grant US$25 million made up of US$2 million Grant and US$23 million concessional funding.
3. **Improving Rural Livelihood through Adaptation in Rain-fed Agriculture Project.** This would support: (a) Climate resilient soil and water conservation investments; (b) Improving livelihoods through productive rural investments; (c) Integrated community risk management; and (d) Strategic knowledge management and project coordination.	Sector Investment Project. US$9 million Grant and US$37 million concessional funding.
4. **Climate-Resilient Integrated Coastal Zone Management.** This would support: (a) Integrated cross-cutting approach to mainstream climate resilience; (b) Knowledge generation and management; and (c) Implementing adaptation measures.	Sector Investment Project US$20 million Grant

133. The four proposed investments are elaborated in more detail below. They are based on the best information available and the consultation carried out in 2011 with the onset of the current round of political unrest in Yemen. Accordingly, final details, particularly on the institutional aspects and linkages with on-going development projects, will be subject to updating following detailed appraisal once the PPCR investments move into the preparation stage.

INVESTMENT I: CLIMATE INFORMATION SYSTEM AND PPCR PROGRAM COORDINATION (CIS-PCU)

134. The main development objective of Investment I is two-fold: i) to deliver hydro-meteorological and climate services to end users effectively; and ii) to maintain Program Coordination of the PPCR. The investment will support over the period 2012-2017, the improvement of hydrometeorological and climate services delivery; increase climate resilience and reduce future economic losses associated with extreme weather caused by climate variability and change; and improve coordination and information sharing between all of agencies responsible for the collection of climate data, analysis and decision-support as well as maintain the oversight of the program, particularly in regards to knowledge management and information sharing with stakeholders.

135. The expected outcomes of the Climate Information Systems (CIS) and PPCR Program Coordination Investment are:

(i) Re-establishment, refurbishment and expansion of a comprehensive and functioning national observing network for weather, water, and climate data relevant to the management of critical climate-sensitive sectors, such as agriculture and water resources.
(ii) Improved coordination between all agencies involved in climate services through sharing of data, knowledge and know-how, and the production of integrated products and services, including multi-hazard early warning, supporting critical policy and operational decisions within Yemen's climate sensitive sectors. This will include coordination with existing programs such as in water and agriculture aimed at strengthening and increasing the use of climate information.
(iii) Better access to climate data and information, increases capacity to evaluate and refine climate change impacts.
(iv) Better quality and more useful information products presented in user friendly, client-oriented format with emphasis on critical sectors, such as agriculture and water resources management, food security, and water security.
(v) Inclusion of evidence-based climate resilience actions within all vulnerable social and economic sectors.
(vi) Routine general and targeted delivery of weather forecasts to end users to clients.
(vii) Functioning early warning systems in at least 3 vulnerable locations.
(viii) Establishment of a mechanism for data sharing.
(ix) Coordination of PPCR implementation, particularly in regards to knowledge management and information sharing across all the investments.
(x) Provision of a single-entry point of contact for the overall program.
(xi) Integration and capacity-building support for gender sensitive approaches and awareness activities in overall PPCR implementation.

136. The program aims to build the infrastructure and human capacity necessary to reduce disaster risks and manage the consequences of climate variability and change. This is a national initiative that includes both national-level and local-level capacity building. The focus will be on expanding the geographic coverage of the climate information database; facilitating its temporal continuity; coordinating

with existing water and agriculture related programs; building the capacity building for line ministries and people stakeholders that will manage the CIS; and disseminating data, analyses and forecasts to inform the public and users at all levels.

137. This will improve local capability for forecasting, analysis and early warning. The uncertainty associated with climate models for the region and poor historical records of climate related data, suggests that Yemen should develop a capacity for seasonal forecasting and early warning with a long lead time and a robust dissemination strategy to make the information readily available to users. Seasonal rainfall estimates are particularly important e.g. for food and water security.

138. These measures will be coordinated with those under Yemen's National Disaster Risk Management Strategy prepared under GFDRR financing which is strengthening Yemen's institutional capacity for disaster risk assessment and risk reduction, and supporting a national civil works program to reduce the risks of flooding. The technical lead executing agency for climate information service will be CAMA with operational working relations developed or expanded with other users and stakeholders. This component would scale up the effort initiated under the Agro-biodiversity and Climate Adaptation Project (ACAP) to coordinate efforts between CAMA, National Water Resources Agency (NWRA); Agricultural Research and Extension Authority (AREA) and the Irrigation Sector of the Ministry of Agriculture and Irrigation (MAI). As the organization representing Yemen within the World Meteorological Organization (WMO), CAMA has access to global weather, climate and water related products created by WMO global and regional centers.

139. This investment will also include support for the PPCR Program Coordination Unit (PCU) which will be housed within the Environment Protection Authority and will technically inform the decisions of the IMCCC.

INVESTMENT II: IMPROVING THE CLIMATE RESILIENCE OF THE WATER SECTOR (ICRWS)

140. The primary development objective is to support the Government of Yemen's efforts to improve climate resiliency and thereby promote sustainable long-term growth and protect vulnerable populations. Climate resiliency of the water sector is an essential part of the future climate-resilient development pathway for Yemen, as water underpins many critical functions of the society and the economy. This operation would support and complement the five development objectives of the NWSSIP which are: (1): Strengthen institutions for sustainable water resources management; (2) Improve community-based water resource management; (3) Increase access to water supply and sanitation services; (4) Increase returns to agricultural water use; and (5) Improve the overall management and protection of groundwater resources through rational control and monitoring of abstraction in critical water basins.

141. The specific objectives of the investment are:

(i) To strengthen the policy environment toward climate-resilient water development strategy by enacting legislative and institutional reforms.
(ii) To support central and local institutions engaged in the water sector improve their capacity in advancing modern technology and management practices to sustain the development of the water sector. This objective would have a multiplier effect by which increasing resiliency of the water sector to climate change in turn contributes to the climate resiliency of local communities, agricultural systems, and rural livelihoods through strong participation of local governments, water groups, civil society and the private sector.
(iii) To establish a common financing mechanism for future climate and risk resiliency projects through the improvement of water information and data systems, improvement of flood control

and watershed management, increase the efficient use of water for irrigation, and improve water supply for domestic use.

142. The proposed investment will be implemented within a time frame of five years (2012-2016)

143. There will be five components:

(1) Enhance existing country-wide water information and data system to become responsive to climate change and improve local planning
(2) Support the development of water policies and related structural changes that would enhance the current NWSSIP/WSSP programs in dealing with water variability and scarcity.
(3) Improve management of watersheds, flood hazards and risks, and groundwater conservation.
(4) Increase the efficient use of reclaimed wastewater.
(5) Project management and monitoring of impact.

144. The investment would utilize a results-based systems of disbursement that will be conditioned on the completion of seven prior actions:

1. Establishment of a system of rewards for WUAs for contributing to improved demand-side water governance as part of IWRM, based on performance metrics (e.g. proportion of wells metered and monitored), and implementation of a program of public awareness and education on water resource management, and prevention and reporting of illegal drilling. The grant would support a better understanding of water resources and climate risks at the local level, and capacity- building of local water groups who may be irrigation WUAs, or more general groups concerned with water use at the level of watersheds which would include rural water supplies and domestic use of runoff and local water conservation systems. Special attention would be given to the role of women.
2. Passing a bylaw or other legislation to give the legal mandate for water law enforcement and implementation for improved supply-side water governance through WUAs/basin committees, including decentralized responses to the national illegal drilling hotline, and creating and publicizing a public accountability mechanism.
3. High-level government commitment to regulate and prepare systematic procedures to monitor the operations of the private sector through licensing and monitoring of drilling contracts and services. The government in close cooperation with WUAs and communities would regulate the contracting of private sector and the commissioning of drilling equipment and monitor their use.
4. Assistance to selected communities to prepare special programs designed to better manage and utilize flood water through collective actions. This would cover support to protect local communities in vulnerable areas by building infrastructure for water harvesting, recharging local aquifers, and for protecting soils and farm assets through well designed participatory watershed management activities.
5. Provide training and capacity- building for both public agencies and community-based groups in flood control management including early warning systems and emergency planning and implementation. The project will coordinate these activities with existing WUAs and other community- based organizations and local self help groups.
6. Encourage famers in vulnerable areas to improve the efficient use of scarce water for irrigation through the adoption of modern irrigation technology. The program will assist poor farmers in water-scarce communities to upgrade their irrigation network to manage frequent

drought by improving on-farm water storage capacity, by using efficient irrigation networks, and by selecting responsive water efficient high value.

7. Support selected communities to increase the efficient management of recycled wastewater. The program would support vulnerable communities to invest in scientifically based management systems and environmentally sustainable technology related to the collection and treatment and utilization.

145. The expected outcomes of this investment are:

1. Improvement in awareness of water management issues and climate risks among government decision-makers, civil society organizations and among the general public
2. Strong participation of local communities and water groups including WUAs in implementing risk management procedures designed to incorporate climate change risks in the management and utilization of water resources, particularly groundwater and floods, at the local level.
3. Mainstreaming of climate resiliency considerations into national development planning, to include the 4th DPPR, and the 2009-2015 NWSSIP.
4. Creation of new financing mechanisms to channel funds to climate and risk resiliency projects.

INVESTMENT III: IMPROVING RURAL LIVELIHOOD THROUGH ADAPTATION IN RAIN-FED AGRICULTURE PROJECT (IRLARA)

146. The project development objective is to improve the resilience of local populations to climate risks through (i) investments in soil and water conservation, using the integrated watershed management approach and piloting Payment for Environmental Services (PES); (ii) creation of alternative income opportunities through promotion of livestock production and lucrative value chains; and (iii) developing integrated community risk management mechanism, including social protection and disaster risk preparedness measures. It would be implemented over the period 2012-2017.

147. The expected outcomes of the IRLARA investment are improved ecosystem stability and provision of goods and services through integrated watershed management approach; labor opportunities for locals; improved water conservation at local level through groundwater management and water harvesting; diversification of income and livelihood strategies; and improved risk management capacity and preparedness of local communities.

148. The rationale behind the proposed IRLARA is to build on the participatory processes and institutional mechanisms established by the ongoing Rainfed Agriculture and Livestock Project (RALP) project to scale-up and mainstream climate resilience into local development planning and implementation. The proposed project will adopt an integrated approach combining soil and water management for climate change adaptation and enhanced provision of ecosystem goods and services; social protection through diversification of livelihood options; and community based disaster risk management for improving the preparedness to respond to climate induced hazards, thus addressing climate and other risks at local level. It will support, strengthen and help scale-up current best practices and help disseminate them among the most vulnerable populations living in areas with high climatic risk, with a special focus on the situation of on women, youth and chronically poor.

149. All three approaches, climate change adaptation, social protection and disaster risk management, are linked by a fundamental concern with reducing vulnerability and building resilience – to poverty disasters and to changes in average climate conditions. The project aims to employ (i) protective measures to provide relief from deprivation (e.g. food price shocks, droughts), (ii) preventive measures designed to prevent deprivation (early warning systems) and (iii) promotional measures aimed at enhancing income

and capabilities (e.g. income generation activities). This combined approach aims to focus on the social and institutional dimensions of vulnerability in addition to the technical and ecological aspects and tailor the interventions to address sometimes very different drivers of vulnerability.

150. The project would also have a special focus on the cross-cutting elements of the PPCR in Yemen: (i) awareness: project will include a special component on awareness raising for governmental and non-governmental stakeholders at sub-national levels, focusing on different groups of stakeholders (decision makers, farmers, Water User Associations, youth etc), (ii) gender: the gender focus will be addressed both through mainstreaming gender in the project design as well as specific gender initiatives such as income generation activities and mobilization of women farmers , (iii) private sector will be engaged (through IFC) in agro-business activities, and (iv) education and research by organizing targeted training events for different groups of stakeholders.

INVESTMENT IV: CLIMATE-RESILIENT INTEGRATED COASTAL ZONE MANAGEMENT (CR-ICZM)

151. The development objectives are a) to enhance capacity and awareness of institutions and stakeholders on climate-resilient ICZM, at national and local levels in selected coastal governorates, and b) demonstrate benefits of implementing climate-resilient ICZM in three target sites.

152. Of the 22 adaptation options identified by the NAPA 15 are of relevance for coastal zone management, including the development and implementation of ICZM programs. An integrated framework for coastal planning and management is necessary to address all key aspects of coastal development, including incorporating climate change adaptation into economic development policies, applying climate resilience elements in existing zoning schemes for coastal areas, and maintaining ecosystem services as a key feature of climate-resilient development. under the auspices of the 2009 National ICZM Decree and the NAPA. An institutional framework informed and supported by climate change adaptation knowledge/information will ensure that coastal resources are managed in a holistic and sustainable manner.

153. The project will focus on the three coastal governorates of Shabwa, Hodeidah and Aden in a two-fold manner:

- creating a long-lasting enabling environment for climate-resilient decision making by the governorates;

- demonstrating climate adaptation measures in select sites within their boundaries, namely Bir Ali (Shabwa governorate), Kamaran-Luhaiyah (Hodeidah governorate) and the coast of Aden (Aden governorate) for future replication and up-scale.

154. The proposed project will consist of four inter-related components, which will be implemented within a time frame of five years:

- Component 1 will focus on strengthening the institutional framework for climate-resilient ICZM in Shabwa, Hodeidah and Aden governorates in the context of the implementation of the National ICZM Decree and NAPA by champion governors, and building the capacity of stakeholders at national and local levels;
- Component 2 will bridge the institutional, knowledge and capacity gap related to coastal climate change modeling by identifying a suitable entity to collect, update and utilize coastal climate records, building its physical (equipment and software) and human (staffing and skills) capacities

and identifying independent sources of funding for its functioning and maintenance after the project is completed. This component will also focus on establishing and maintaining the necessary institutional linkages with relevant agencies, research centers and programs such that relevant data and information are available for development planning and decision/policy making processes. The component will result in climate change modeling specific for Yemen's coast, thus adding a coastal dimension to the proposed National Climate Information System funded by the PPCR's Enhancing Climate and Risk Management Capabilities TA;

- Component 3 will demonstrate optimum adaptive development practices within the National ICZM Decree and NAPA frameworks, covering diversified income sources, climate-resilient infrastructure and improved ecosystem services to improve social safety nets by increasing climate resilience at the three target sites; and
- Component 4 will focus on project coordination, financial management, procurement and M&E.

155. Expected outcomes of support for ICZM are:

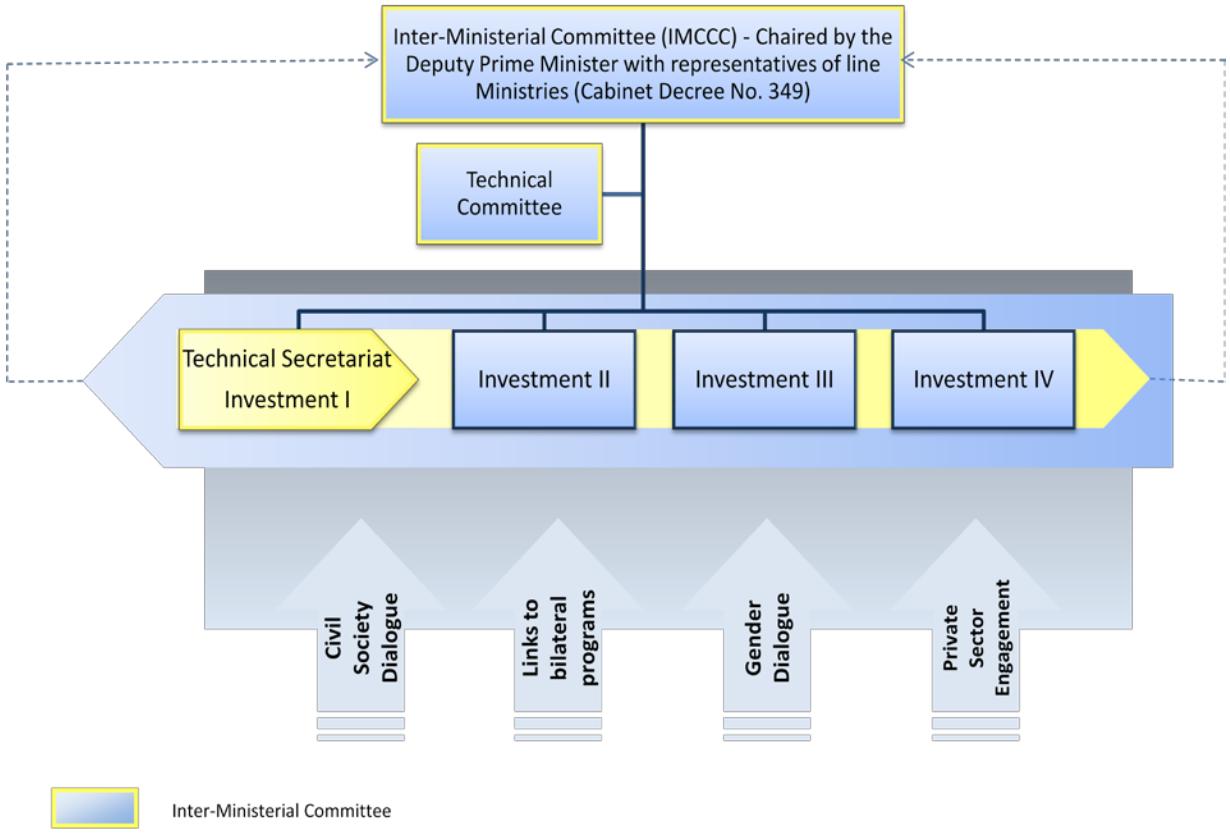
- Strengthened institutional capacity for climate-resilient ICZM at Shabwa, Hodeidah and Aden governorates;
- Increased awareness of institutions and stakeholders to ICZM and climate change;
- Increased capacity of local practitioners to generate localized, downscaled climate change models, and established linkages with the future National Climate Information System, leading to informed decision making and development planning for the coast; and
- Demonstrations of climate adaptation measures at three target sites.

7. PPCR Management Structure and proposed Framework for the SPCR Investment Program

156. As per Cabinet Decree No. 349, the highest decision-making body is the IMCCC, as a sub-set of several ministries of Yemen's Cabinet. A key function of the IMCCC is to advise and inform the Cabinet about the Government's decision-making on expenditures and ensure that climate change considerations are taken into account in pertinent investment decisions. To ensure that cross-sectoral information from technical studies and other knowledge sources are distilled and integrated into appropriate communication tools for IMCCC's advocacy to the Cabinet, the IMCCC will be supported by the Technical Committee, which entails representatives from related agencies. The EPA was appointed to accommodate the Technical Secretariat to the IMCCC, and to coordinate the activities of the IMCCC as well as to be the main interlocutor to ensure communication with all national agencies related to climate change (Figure 5).

157. The Technical Secretariat based in the EPA will house the Program Coordination Unit (PCU) which will have a dual role, at first, the oversight of the program, particularly in regards to knowledge management and information sharing. The PCU by also utilizing the expertise from the Technical Committee, would analyze best available information, identify gaps, prepare TORs for further analytic work as needed, and consolidate the results achieved by the investments for presentation to IMCCC. The second role would be to implement Investment I which is designed to strengthen Yemen's national meteorological and hydrological services to improve weather climate and hydrological service delivery, which will be technically executed by the Civil Aviation & Meteorological Authority - Yemen Meteorological Service (CAMA-YMS). This arrangement supplemented by the establishment of a central database aims to ensure the integration of the climate services information into the all key agencies. Integration of knowledge and results generated under PPCR investments, would be synthesized, distilled and integrated at the level of the PCU to ensure that learning is captured across all aspects of the program.

Figure 7: SPCR Management Structure and Proposed Framework for the SPCR Investment Program



158. All four proposed investments will be detailed in a legal agreement to identify the role of the host agency, the role of the executing agency, the roles of NGOs and all relevant stakeholders, accounting mechanisms, the agreed procedures for disbursing project funds to approved project activities, a list of allowable expenditures, and contracting mechanisms.

159. At present Phase 1 activities are being implemented and the results will be vital for strengthening the institutional and technical capacities required to integrate climate change into policies and program and will provide an enhanced evidence base on climate vulnerabilities in priority sectors. The results will help understand more clearly the potential for transformative investments for specific activities in water, agriculture and coastal zones in Phase 2 of the PPCR. The recommendations of the institutional assessment will underpin the design of a capacity-building component for each investment that will be prepared. The institutional assessment will pay special attention to the present political environment. Importantly, the assessment will take cognizance of the lessons from 'Programmatic Multi-Donor Trust Funds in Fragile and Conflict-Affected Situations',[61] and would provide recommendations for effective utilization of donor resources to inform the modalities for actual procurement and disbursement under the

61. Flexibility in the Face of Fragility: Programmatic Multi-Donor Trust Funds in Fragile and Conflict-Affected Situations, Operational and Country Services Fragile and Conflict-Affected States Group (OPCFC), World Bank, July 2010.

investments planned under the PPCR so that the anticipated results can be achieved within the implementation timeframe of Phase 2 of the PPCR.

160. While respecting the cultural setting, each Project Management Unit will be staffed by 1-2 female specialists seconded from the entity implementing the investment (Figure 6). The Terms of Reference of each Project Director will be enhanced by including making specific reference to ensure that a thorough inclusion of female colleagues as well as ensuring targeted training aimed at female colleagues. The Women and Environment Unit of as the Environment Protection Authority, with the support of local women's NGOs, will be entrusted to monitor and evaluate on a regular basis the gender inclusion across all investments. This will include annual assessments on how to improve gender aspects with recommendations for improvement.

Risk to Implementation Arrangements

161. The security situation in Yemen may hinder the smooth operation of the implementation structure and the consultation process. An additional risk to the program is that security challenges may either result in high turnover of key personnel, or push climate resilience so far down the list of priorities that the PPCR governance arrangements effectively cease to function. To mitigate against this risk, implementation would rely on the institutional arrangement of on-going projects which are operational, or would establish standard implementation arrangements as per the provisions of the WB/IFC.

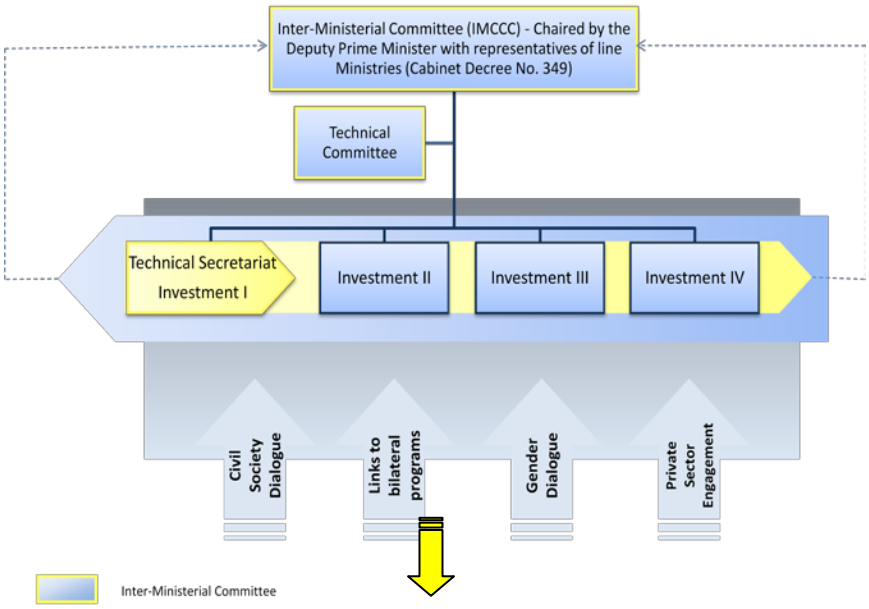
162. The SPCR would keep the implementation procedures simple, utilizing established institutional structure where possible (while minimizing the number of new structures), and counter the risks of implementation through silo structure by ensuring cross-coordination. Knowledge management and sharing of knowledge has been built into the implementation process explicitly to ensure that learning is captured across all aspects of the program. The PCU would be insulated from the day-to-day management of individual investments in order to maximize its attention to program oversight and coordination, programmatic learning, leverage, dissemination and outreach.

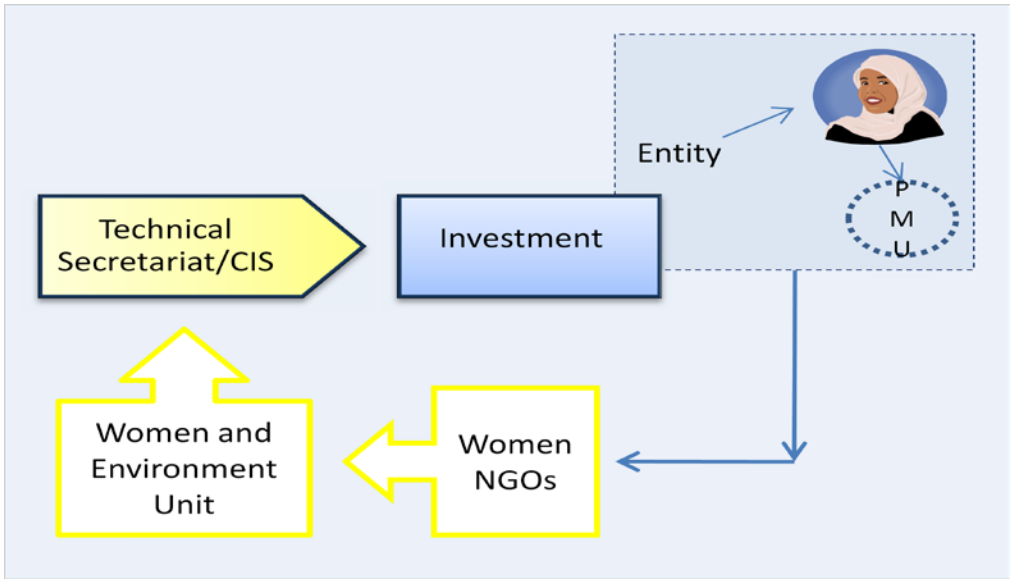
163. An additional mitigation mechanism is based on the fact that the proposed investments entail a mix of policy actions and activities at the national, regional and local level. At the local level most SPCR investment related activities would be carried out in rural areas focusing on poor and marginalized communities. In the worst case security scenario it is believed that most of the proposed activities at the local level would remain viable.

There is a substantial risk to inaction

164. Yemen is a country with limited resources and high vulnerability to climate change in critical sectors. Action to increase resiliency needs to begin now. The planning horizon for both the 4th DPPR and the NWSSIP update, currently in preparation, extends to 2015. If this opportunity to include climate resiliency at the core of national development planning is missed, at least four years will be lost during which time scarce national resources will be spent without consideration of climate vulnerability and climate resilient development may continue only in piecemeal fashion. The present moment is critical: seizing the moment of the launch of these two major national strategies to "lock in" the climate resiliency agenda for the imminent and future planning cycles will allow the important and long-term work of increasing Yemen's resiliency to climate risk to begin immediately. Inaction will only lead to a further marginalizing of a most vulnerable country and its population.

Figure 8: Gender Smart Management Framework





165. There is a risk that government and local institutions may lack the capacity to sustain the changes made by the prior actions (e.g. the incorporation of climate resiliency in future iterations of development planning). Recommended countermeasure would be to use ongoing capacity-building and reinforcement as part of the other investments under the DPPR, WSSP/NWSSIP, and SPCR.

8. Participation Process

Consultation Process

166. The preparation of the PPCR proposal and SPCR document was conducted through a wide range of consultation processes, including meetings with relevant line institutions, stakeholder consultation workshops, and donor round tables. The series of consultations with different stakeholders and the PPCR missions that were conducted during PPCR Phase I are as follows:

- PPCR Scoping Mission, July 2009
- PPCR 1st Joint Mission, March 12-19, 2010
- PPCR Mission, May 8-12, 2010
- Supervision Mission, Oct. 28 to Nov 4, 2010
- Consultation Workshop on PPCR , Aden, 28 December 2010
- PPCR Joint Mission, Addis, Ethiopia, March 10 -18, 2011
- PPCR Mini-retreat, May 3, 2011

167. Government officials, local stakeholders, donors and development partners raised important issues and helped identify and address critical gaps in the SPCR document and investment concepts during PPCR Phase I, based on which the SPCR document was amended accordingly.

168. The PPCR consultation process was difficult to carry out at times due to political conflicts in Yemen. A second joint mission was planned to be carried out in February/March, 2011 to further elaborate on the main SPCR document and to proceed the development of the concepts for the PPCR investments. However, the Bank/IFC was not able to conduct a formal second joint mission on the PPCR due to the deterioration of political conditions and civil unrest in Yemen that precluded formal stakeholder workshops and donor roundtables. Even so, the Yemeni counterparts in the EPA continued internal dialogue with government and NGOs, sharing ideas and progress, and benefitting from feedback received. The strong coordination within the country lead by the Deputy Prime Minister in his capacity as the Chair of the IMCCC was helpful in providing the needed input and guidance throughout the process. Subsequently, the Bank team used the opportunity to meet with the Yemeni counterparts in Addis Ababa, Ethiopia, from 10th to 18th March, 2011, to shape the draft SPCR. Since then the Bank has had regular and telephone conferences with local counterparts in Yemen guided by the EPA in Sana'a to update the draft SPCR. This was supplemented by feedback received from key stakeholders through emails and bilateral meetings via teleconference. The EPA was leading the key stakeholder consultation process which further supported the development of the SPCR to its present shape.

169. The various stages of the Yemen PPCR were prepared in close consultation with stakeholders. In Yemen this included relevant line ministries, government agencies, bi- and multi-lateral donors and regional financiers, NGOs, civil society groups and community based organizations at the national and local levels. National level institutions included: Ministry of Water and Environment (MWE), Irrigation and Land Reclamation Sector within the Ministry of Agriculture and Irrigation (MAI), International Cooperation Sector within the Ministry of Planning and International Cooperation (MPIC), Ministry of Finance (MoF), Marine Science and Biological Research Authority within the Ministry of Fish Wealth, Ministry of Education, Ministry of Public Health, National Water Resource Authority (NWRA), Meteorological Sector within Civil Aviation and Meteorological Authority (CAMA).

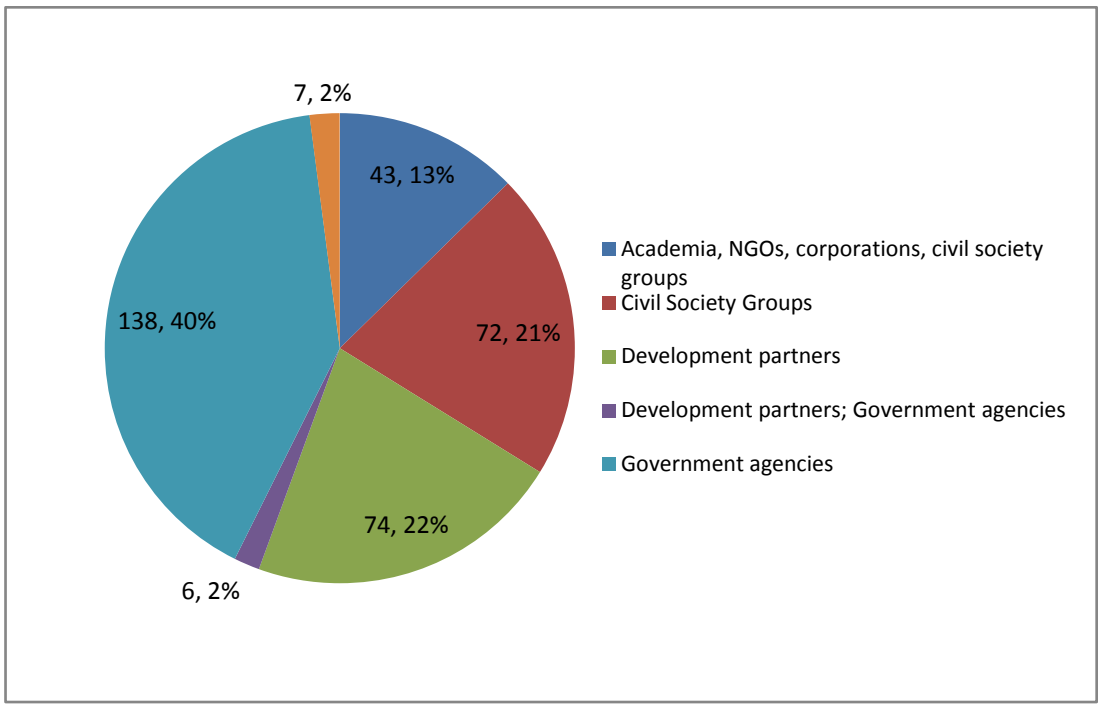
170. International stakeholders were also consulted and participated in roundtable conferences and workshops in Yemen and subsequently via telephone conferences and emails. This included a number of bilateral partners that are active in Yemen: Government of Germany, the Netherlands, France, the UK,

the US, Japan, Italy, and several of multilateral partners like the World Bank, the UN System, FAO, and WHO. Other important partners included the Kuwait Fund, Islamic Development Bank, and the Arab Fund. During the development of the SPCR document the views of these stakeholders was sought by email and teleconferences, and this process will continue. The Government of Yemen is particularly grateful to all the stakeholders for their active participation and feedback received which helped to strengthen the SPCR document, all despite the challenging situation.

171. Civil Society Organizations and other stakeholders such as academic and research institutes, corporations, NGOs, community based organizations, farmers and fishermen unions and societies were engaged and participated actively as important partners and key stakeholders. It is envisaged to continue and increase their involvement in the activities under the PPCR at different stages and also to incorporate their feedback into the design, implementation, and evaluation of the PPCR activities.

172. Women in rural areas of Yemen play vital role in water and agriculture related activities and are considered the most vulnerable group to the adverse impacts of climate change. Therefore, involvement of women in climate change activities at local and community levels is essential for increasing climate resilience and enhancement of adaptive capacity of these key vulnerable sectors. Feedback from women's groups, such as Yemeni Women's Union (YWU) and Women Environmental Society, were actively sought whenever feasible throughout the SPCR preparation process. Figure 7 shows the various types of stakeholders consulted as of May 11, 2010, throughout the PPCR Phase I.

Figure 7: Number and percentage of participants consulted by types of organizations as of May 11, 2010



This participatory process helped build national and local ownership of the PPCR, and enabled participants to reach consensus on the priorities for action by the public and private sectors given the climate risks facing the country. Consultations with donors and development partners that are active in Yemen also helped identify potential synergies and avoided duplication of efforts. These efforts will continue throughout the preparation phase of all proposed investments.

Part 2: Proposed Investment Program Components

A. Investment I: Climate Information System and PPCR Program Coordination (CIS-PCU)

B. Investment II: Improving the Climate Resilience of the Water Sector

C. Investment III: Improving Rural Livelihood through Adaptation in Rain-fed Agriculture Project (IRLARA)

D. Investment IV: Climate-Resilient Integrated Coastal Zone Management (CR-ICZM)

Climate Information System and PPCR Program Coordination

(CIS-PCU)

Concept Note

INVESTMENT I

(A) BACKGROUND

1. Yemen faces multiple risks and has experienced at least one natural disaster every year for the last twenty years. Its topography of rugged mountains, highlands, deserts, and coastal plains, coupled with arid weather conditions, render it highly susceptible to desertification and floods. Climatic variability is increasing negative impacts on agriculture as well as vulnerability to natural disasters due to an increased probability of extreme weather events. A rise in sea level would result in increased coastal flooding, impact freshwater availability and affect the country's already fragile water balance. Food security is becoming a more urgent problem with natural population growth and the depletion of groundwater resources where recharge rates are lagging. Floods are now the most recurrent natural disaster in Yemen, and cause significant economic damage and loss. Located in the seismically active zone between the Arabian and African tectonic plates, the western and southern portions of Yemen are at risk from earthquakes. Yemen's mountainous terrain renders the entire country at risk of landslides.

2. Given Yemen's exposure to weather and climate risks, climate change poses a significant threat to Yemen's development. Agriculture remains the country's most important productive sector, contributing 14.4% of the country's GDP and employing over 53 percent of the country's labor force[62]. Agriculture is estimated to use 93 percent of available surface and ground water, yet Yemen's ground water reserves are expected to be exhausted in two to three decades. Not considering climate change, this would result in reductions in output of over 40% by 2030. Agriculture will become increasing dependent on rainfall, and rainfall predictability will be key to crop selection and prediction of crop yields. Thus a climate information service will help Yemen manage its agriculture and water resources food and water security in an integrated manner.

3. Improving weather, climate and water services in Yemen is essential for stable social and economic development. Reliable weather forecasts and outlooks; knowledge of weather, water and climate events, and their extremes and alterations in the changing climate; and adaptation to climate change are all necessary for a sustainable development of the country. The need to establish and maintain a data base for climate change is one of the key actions in the National Adaptation Program of Action in 2009. Amongst the actions proposed is systematic measurement of water availability, including groundwater occurrence and depth. Upgraded weather, climate and water information will pave the way for early warning systems, disaster reduction strategies to build disaster resilience and reduce vulnerabilities to natural hazards, and improved water resources management on which food and water security depend. The value of hydro-meteorological data and good forecasting are increasingly understood and appreciated by various sectors in Yemen. However, in order to be able to improve hydro-meteorological services, it is necessary to expand and upgrade the hydro-meteorological observation network, install state-of-the-art equipment and software for forecasting and analysis, foster inter-agency cooperation, and to share data and knowledge with stakeholders through effective weather, climate and water services. The quality of these services is directly related to the relevance and lead time of the forecasts and analyses, which rely on the accuracy of global and regional numerical weather prediction models and local-scale forecasting skills. These in turn depend on the availability and quality of hydro-meteorological observation data and the technical and human resources of the hydro-meteorological service, as well as the capacity to cooperate and share data between agencies to develop relevant information services.

4. The range of factors that pose a challenge for addressing climate change and disaster risk reduction in Yemen can be categorized into three broad categories. The three main sector issues that need

[62]Summarized from World Bank Case Study ' Assessing the Impact of Climate Change and variability on the Water and Agricultural Sectors, and Policy Implications', 2010 as cited in Climate Risk and Adaptation Profile, Vulnerability, Risk Reduction, and Adaptation to Climate Change, Yemen' GFDRR, 2011.

to be addressed with urgency are – (i) data collection monitoring and early warning systems; (ii) inadequacy of hydro-meteorological stations; and (iii) institutional factors inhibiting data sharing and coordination. Addressing these sector issues would lead to the development of warning systems that could stem recurring economic losses and the loss of human lives from weather-related disasters, and they could contribute to stable social and economic development.

(i) Data collection, monitoring, and early warning systems: Yemen's institutional capability to cope with current and projected changes in climate is low, hampered by a lack of long-term reliable data, as well as weak technical capacity to analyze the data. Long-term observations of precipitation and temperature data are very scarce in Yemen. Early, short-lived records are available for Aden, Sana'a and Ta'iz in a highly-fragmented manner that extends from the 1970s to present. Furthermore, there are recognized quality concerns associated with daily and monthly meteorological records[63], other data have yet to be digitalized or have been lost.[64] There are also fundamental inconsistencies between annual reporting sheets and digital archives relating to station details, such as latitude, longitude and elevation. Some Global Climate Models and Regional Climate Models applied to Yemen[65] report serious shortcomings with basic data that make difficult the assessment of the impacts and policy implications of climate change and variability on the water and agricultural sectors. Additionally, three studies supported by the Global Facility for Disaster Reduction and Recovery (GFDRR) allude to serious short-comings in the availability of hydro-meteorological data.[66]

(ii) Inadequacy of hydro-meteorological stations. The current network of hydro-meteorological stations in Yemen is inadequate to inform end users of the expected weather and climate changes. A functional and consolidated network of sufficient density to respond to the large spatial variations in topography and include the different climatic zones and hot spots in the entire country does not exist. Few stations have more than 20 years of data and their distribution is sparse, concentrated in the western highlands (Figure 1). It is unclear how many of the existing stations are operational. Consequently there is little scope for evaluating climate variability, weather extremes, or climate change. It is critical to invest in new state-of-the-art observation and monitoring technology, and in modern communications systems, software and training. There is an urgent need to prevent further degradation of the climate observing system, systematize data collection and dissemination and improve data quality for climate change assessments.

(iii) Institutional factors in Data sharing and Coordination: Institutional factors severely impede effective utilization of even the limited data and information that is available. Most the changes that are needed are institutional, i.e. not those that can be undertaken swiftly by a small number of key civil servants with support of targeted technical assistance. Several agencies collect some climate data: Yemen Geological Survey & Mineral Resources Board (YGSMRB), Yemen Seismic & Volcanic Observation Center (YSVOC), Civil Aviation & Meteorological Authority - Yemen Meteorological Service (CAMA-YMS), National Disaster Management Unit (NDMU), Ministry of Public Works & Highways (MoPWH), National Water Resource Authority (NWRA), the Tihama Development Authority (TDA), the Ministry of Agriculture and Irrigation (MAI) and the Agriculture Research and Extension Authority. The Disaster Risk Management Unit (Civil Defense), the Remote Sensing and GIS Center, and

[63] World Bank (2009): An Evaluation of Climate Data and Downscaling Options for Yemen.

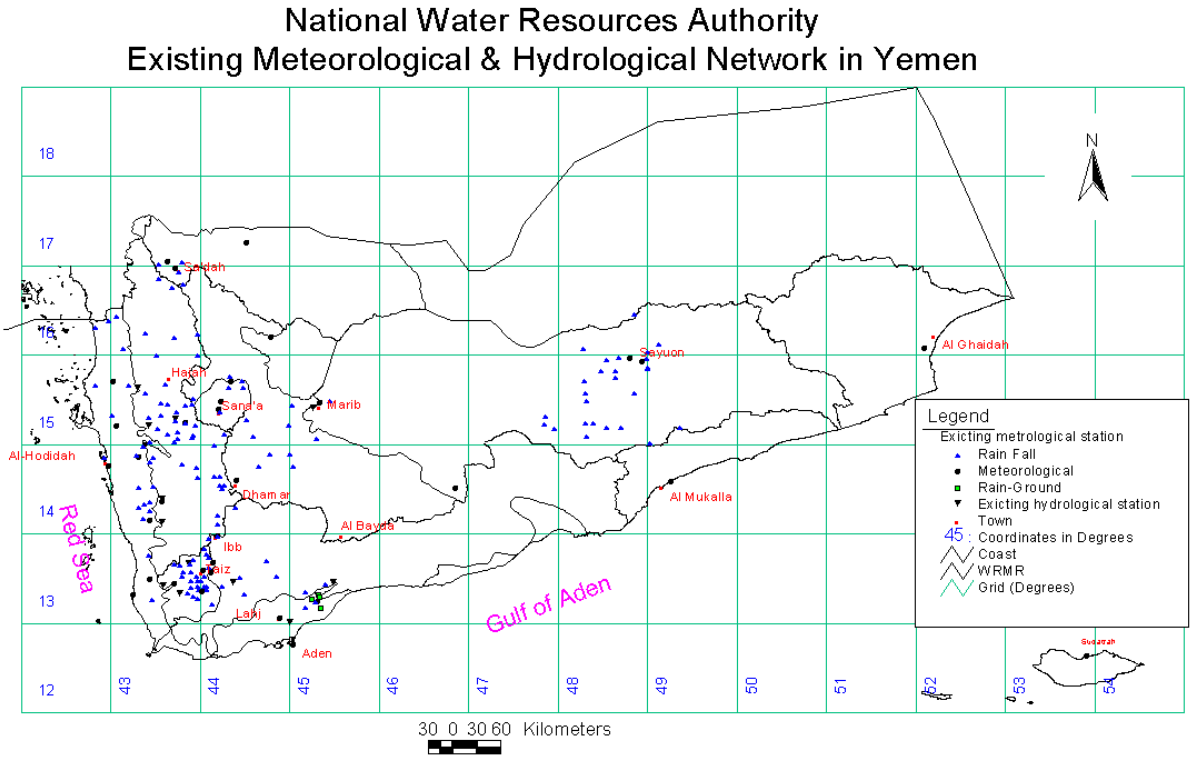
[64] See for example the critique of rainfall and river flow records for the Wadi Zabid: Ministry of Agriculture and Irrigation, 2003. Irrigation and Improvement Project (IIP) Working Paper 25. Republic of Yemen, 121pp.

[65] World Bank (2009): An Evaluation of Climate Data and Downscaling Options for Yemen.

[66]. The GFDRR supported studies completed by the Yemen Geological Survey and Mineral Resources Board: (i) the National Probabilistic Risk Assessment; (ii) the Al Mahara and Hadramout Probabilistic Risk Assessment; and (iii) the Sana'a Natural Risk Evaluation and Risk Planning. These studies present an analysis of the capacity of various national and sub-national entities in Yemen to respond to disasters, and provide a basis to develop comprehensive risk management strategies; they all included critical review of source data.

the Hyogo Framework for Action Office in the Ministry of Environment (MWE), the Environment Protection Authority (EPA) are all critical entities that carry responsibilities for data analysis, and climate and weather related disaster outreach to communities. However there is little coordination, cooperation, or sharing of data between and amongst these agencies. For example, in 2010 the Remote Sensing and GIS Center published a comprehensive national Atlas that did not include climate. While there is a sufficiently large number of trained people in CAMA, NWRA; MAI, AREA and YRSC, to provide a basis for a strengthened weather, climate and water services system their climatic work needs to be technically coordinated following quality standards and assurance on the technical level provided by CAMA

Figure 1: Existing Meteorological & Hydrological Network in Yemen



(B) DEVELOPMENT AND SPECIFIC OBJECTIVES

5. The project scope will cover all five of Yemen's major land systems: (i) the hot and humid coastal plain; (ii) the temperate Yemen highlands; (iii) the Yemen High Plateaus and Hadramout and Al-Mahara Uplands; (iv) the desert interior; and (v) the islands.

6. The Project Development Objective (PDO) of the Climate Information System and PPCR Program Coordination Investment is two-fold: i) to deliver hydro-meteorological and climate services to end users effectively; and ii) to maintain Program Coordination of the PPCR. The climate information system will underpin the national information needs in all of the climate sensitive sectors, including agriculture, water resources management, food security and water security. The system will include a central, shared repository of climate information and know-how accessible by all Yemeni stakeholders. It will carefully assess as already being carried out through Phase 1 of existing activities and will therefore carefully supplement ongoing efforts.

9. The outcomes of the project will be:

(i) Re-establishment, refurbishment and expansion of a comprehensive and functioning national observing network for weather, water, and climate data relevant to the management of critical climate-sensitive sectors, such as agriculture and water resources.
(ii) Improved coordination between all agencies involved in climate services through sharing of data, knowledge and know-how, and the production of integrated products and services, including multi-hazard early warning, supporting critical policy and operational decisions within Yemen's climate sensitive sectors. This will include coordination with existing programs such as in water and agriculture aimed at strengthening and increasing the use of climate information.
(iii) Better access to climate data and information that, increases capacity to evaluate and refine climate change impacts.
(iv) Better quality and more useful information products presented in user friendly, client-oriented format with emphasis on critical sectors, such as agriculture and water resources management, food security, and water security.
(v) Inclusion of evidence-based climate resilience actions within all vulnerable social and economic sectors.
(vi) Routine general and targeted delivery of weather forecasts to end users to clients.
(vii) Functioning early warning systems in at least 3 vulnerable locations.
(viii) Establishment of a mechanism for data sharing.
(ix) Coordination of PPCR implementation, particularly in regards to knowledge management and information sharing.
(x) Provision of a single-entry point of contact for the overall program
(xi) Integration and capacity-building support for gender sensitive approaches and awareness activities in overall PPCR implementation

(C) KEY INDICATORS AND BASELINE

8. Achievement of project outcomes will be assessed at the end of the project implementation period by the following indicators:

(i) % increase in number of weather/climate data gathering stations functional, over the baseline to be established during project preparation.
(ii) Daily weather forecasts published in at least two most widely circulated newspapers; daily radio and television bulletins broadcasts on the weather in different parts of the country (separate and integrated into the national broadcast network); early warning systems functional in areas identified as vulnerable to disasters; monthly reports on weather and climate predictions dispatched to select Ministries (identified during preparation).
(iii) Improved seasonal prediction of main climate indicators relevant to agriculture and water resources management.
(iv) Delivery of at least two evacuation/rescue drills a year, after Year 2 of the project, in select vulnerable locations after early warning systems are established.
(v) PPCR coordination mechanism operational.
(vi) Improved understanding of gender-specific implications of climate change among stakeholders and implementers of activities.

9. The baseline information and data required to assess progress are: (i) Number of existing weather observing stations; (ii) Number/percentage of functioning existing weather observation stations; (iii) Number of targeted stations to be established as per preparatory study; (iv) accuracy and spatial representativeness of current seasonal forecasts; (v) current budget allocation for O&M of the climate network; (vi) projected budget allocation for O&M determined during project preparation; (vii) number of newspapers that currently carry weather forecasts; (viii) existence of early warning systems in vulnerable locations; (ix) number of preparedness drills carried out in vulnerable locations; and (x) delivery of communication campaigns in vulnerable locations.

(D) ANTICIPATED COMPONENTS AND ACTIVITIES

10. The proposed project has three components:

(i) Component 1: National network of hydro-meteorological stations
(ii) Component 2: Human and Institutional Capacity Building
(iii) Component 3: PPCR Program Management and Knowledge Sharing

11. **Component 1: National network of hydro-meteorological stations:** This component will support goods, consultancies and works to ensure adequate infrastructure for a comprehensive national observing network. It will finance the restoration and expansion, as necessary, of core observing networks including automatic weather stations to provide data needed to improve empirical (statistical) downscaling of climate information from coarse spatial scales to finer scales. This will improve understanding of the relationship between the large scale patterns of climate elements (e.g. indicators of atmospheric circulation) and the local climate (e.g. seasonal, monthly or daily temperature and precipitation), contributing to increased reliability of climate change scenarios.

12. **Component 2: Human and Institutional Capacity Building:** This component will support consultancies, training, and goods to build the capacity of agencies and their staff, to sustainably observe, collect, and forecast weather, water and climate information; and deliver weather forecasts to end users to clients. It will develop a road map for the modernization of Yemen's Weather and Climate Information Services; finance technical design of the system of hydro-meteorological and climate monitoring data system (with necessary equipment and works financed from Component 1), support continuous training throughout the project implementation period across disciplines/ agencies/ ministries to help develop and sustain a coherent integrated warning and decision-support system; develop simulation models for vulnerability of communities and assets as well rapid response and evacuation plans; training for vulnerable communities and the agencies responsible for their safety; targeted communication for information dissemination to differentiated and disaggregated end users; development and implementation of early warning systems for different location specific hazards; and identify and support the implementation of regulatory and institutional changes.

13. **Component 3: Program Management and Knowledge Sharing:** This component will support incremental operational costs of Program Management, including that of consulting staff and training. It will carry out the oversight of the PPCR implementation, particularly in regards to knowledge management and information sharing. It will regularly consolidate the results achieved by the investments for presentation to the Inter-Ministerial Committee for Climate Change (IMCCC). The component will carry out public education and outreach activities geared towards improving information access and awareness rising of the challenges caused by climate change. It will also develop and disseminate targeted knowledge products that are relevant to a variety of stakeholders and distil in a synergistic effort the results achieved by the fours investments under the SPCR. Support and monitoring of the integration of gender sensitive approaches throughout PPCR implementation will be given a high priority.

(E) INSTITUTIONAL ARRANGEMENTS

14. The Phase I proposal supports an assessment of the capacity of the Ministries of the IMCCC to carry out their ministerial mandates with a view to identifying technical skill needs in the current staffing of the respective ministries for developing, advocating, and facilitating implementation of policies and activities that contribute to building resilience to climate change in Yemen. The recommendations of the institutional assessment will support the design of a capacity- building component for each investment that will be prepared and will underpin the institutional arrangements during the preparation phase. The assessment will take cognizance of the lessons from 'Programmatic Multi-Donor Trust Funds in Fragile and Conflict-Affected Situations'[67] that provides recommendations for effective utilization of donor resources. These include, informing the modalities for actual timely procurement and disbursement under the investments planned for the PPCR.

15. The assessment will also review absorptive capacity issues discussed in the Republic of Yemen's Fourth Socio-Economic Development Plan (2011-2015). [68] This includes the proposal to put in place a mechanism for integrated risk management from disasters, climate change, food insecurity and water scarcity.

16. The Technical Secretariat based in the Environment Protection Authority will house the Program Coordination Unit (PCU) which will have a dual role. First, the oversight of the program, particularly in regards to knowledge management and information sharing; second, to implement Investment I which is designed to strengthen Yemen's national meteorological and hydrological services to improve weather, climate and hydrological service delivery, which is technically executed by CAMA. Under its primary role, the PCU will oversee integration of knowledge and results generated under PPCR investments, and ensure that these would be synthesized, distilled and integrated at the level of the PCU to ensure that learning is captured across all aspects of the program.

17. The PCU by also utilizing the expertise from the Technical Committee, would analyze best available information, identify gaps, prepare TORs for further analytic work as needed, and consolidate the results achieved by the investments for presentation to IMCCC. As a sub-set of the ministries of Yemen's cabinet, the main role is advocacy to the cabinet to technically inform the Government's decision-making on expenditures, such that climate change considerations are taken into account in all pertinent investment decisions. To ensure that cross-sectoral information from technical studies and other knowledge sources are distilled and integrated into appropriate communication tools for IMCCC's advocacy to the Cabinet, the IMCCC will be regularly updated by the PCU. The PCU will advise the Cabinet and IMCCC on prioritized and sequenced investment options for consideration by the Government.

18. Institutional arrangements will be finalized after capacity assessment studies are completed.

(F) RISKS

19. *Main Risk*: The main risk to achieving the outcome from this project is the sustainability of service delivery to end users from the hydro-meteorological system the project aims to put in place. This risk to service delivery would be largely due to human resource factors. It could materialize as a result of

[67] Flexibility in the Face of Fragility: Programmatic Multi-Donor Trust Funds in Fragile and Conflict-Affected Situations, Operational and Country Services Fragile and Conflict-Affected States Group (OPCFC), World Bank, July 2010.

[68]

(i) aversion on the part of agencies to bring in staff with appropriate skills; (ii) trained staff cannot be retained by the parent agency; or (iii) the trained staff are unwilling to perform due to a lack of incentives.

20. *Mitigation*: The project can and will put in place mitigation measures for the duration of the project's life. After the project closes, however, sustaining service delivery would require a level of institutional reform and access to resources that are beyond the scope of this project.

21. Main Risk: Political instability and security risks. Lack of security and political stability in the country are affecting the entire Yemen portfolio.

22. *Mitigation:* The institutional arrangement will pay special attention to the present political environment. It will take cognizance of the lessons from 'Programmatic Multi-Donor Trust Funds in Fragile and Conflict-Affected Situations,' [69], and would provide recommendations for effective utilization of donor resources to inform the modalities for actual procurement and disbursement under the investments planned under the PPCR so that the anticipated results can be achieved within the implementation timeframe of Phase 2 of the PPCR.

23. *Main Risk:* Changes in Government personnel (particularly in key counterpart positions) could militate against the progress and the 'ownership' of the Program.

24. *Mitigation*: Sustained engagement of government contacts and decision makers.

(G) INVESTMENT COSTING

25. The total cost of the proposed project is US$19 million. The Government of Yemen will provide some co-financing through in-kind contributions. The cost per component is estimated as follows:

COMPONENT	**COST (US million)**
COMPONENT 1: National network of hydro-meteorological stations	10
COMPONENT 2: Human and Institutional Capacity Building	3
COMPONENT 3: Program Management and Knowledge Sharing	6
TOTAL	**19**

[69] Flexibility in the Face of Fragility: Programmatic Multi-Donor Trust Funds in Fragile and Conflict-Affected Situations, Operational and Country Services Fragile and Conflict-Affected States Group (OPCFC), World Bank, July 2010.

(H) RESULTS AND PERFORMANCE FRAMEWORK

Component	Outputs	Outcomes	Indicators	Critical Conditions
Component 1: National network of hydro-meteorological stations	National network re-established and expanded, operational and conforms with standards	Production of reliable data and information.	Quantity and type of acquired equipment	
		Early warning systems functional in three areas identified as vulnerable to disasters.	Number of stations in conformity with international norms	Degree of acceptance and ownership by targeted users
			Increase in number of hydro-meteorological stations	
	Information and data are centralized, shared and exploited	Information and data are used for planning and implementation of future programs and projects	Number of MOUs signed with entities for data access	
Component 2: Human and Institutional Capacity Building	Human and institutional capacities to develop, sustain and use a coherent integrated warning and decision-support system established	Increased capacity of practitioners to data leading to informed decision making	Number of end-users using meteorological information and products	Stakeholders actively participate in training events to acquire technical skills and build cohesion
		Routine general and targeted delivery of weather forecasts to end users to clients.	Number of evacuation/rescue drills in select vulnerable locations after early warning systems are established.	National institutions and local government actively participate in planning and training events
			Number of weather	

Component	Outputs	Outcomes	Indicators	Critical Conditions
			forecasts published in national newspapers; aired on radio and television.	
Component 3: Program Management and Knowledge Sharing	Efficient program coordination and knowledge management mechanisms developed and utilized Integration and capacity-building support for gender sensitive approaches and awareness activities in overall PPCR implementation	IMCCC is regularly updated on SPCR implementation Relevant information concerning PPCR activities is shared at national and international levels Single entry point for PPCR program is provided Increased capacity of female practitioners	Number of information sharing activities on program initiatives Proportion of approved annual work plans implemented Number of capacity-building activities for gender sensitive approaches Proportion of approved annual work plans implemented	Different national stakeholders have appropriate technical capacities

Investment II: Improving the Climate Resilience of the Water Sector

(ICRWS)

Concept Note

INVESTMENT II

(A) BACKGROUND

1. The water sector in Yemen is facing mounting challenges due to increasing demands among the growing population and declining supplies because of the depletion of water resources. Yemen experiences a high level of water stress. This challenge is likely to intensify with increasing variability in climate change including rising temperature and severe fluctuations in rainfall patterns. This challenge would have serious impacts on several sectors. Most economic activities depend on the resilience of water supply especially agriculture, urban development, and industry. Institutional weakness undermines the ability of the state to address vulnerabilities. Demographic pressure with high population growth rates and significant rural to-urban migration combined with a poor economic outlook pose a substantial threat to Yemen's future development.

2. The risk facing the water sector would have serious implications on agriculture. Agriculture in Yemen uses between 80-90% of the water and employs 70% of the population, but occupies only 3% of the land area of Yemen. Because of the interconnected nature of these critical sectors of the economy, changes in climatic variables will bring accompanying variations in the biophysical underpinnings of the economy, with corresponding g knock-on effects that will ripple outward through the entire society. The interlocking problems of water and agriculture are expected to have serious implications for food security in the country which already relies heavily on imports of significant proportion of its foodstuffs. Resilient rural water supply is also instrumental in rendering rural livelihoods more sustainable, thereby allowing rural residents to remain on their land and helping to curb migration to the cities with the attendant pressures that it creates. Climate change is also projected to increase the frequency and severity of natural disasters such as droughts, floods, and storms.

3. Many measures designed to reduce exposure to climate risks could increase the resilience of rural communities and their agricultural assets and production systems. Improved watershed management and terraced agricultural systems increase resilient to climate change due to their increased ability to capture and retain rainwater and to resist erosion. Intervention in better management of natural resources could reduce runoff and thus prevent flash flooding and associated risks of damage and dislocations of vulnerable communities.

4. The government of Yemen with the support of several donors have designed several development programs targeting all three of the water, agriculture, and coastal zone sectors. Donors including Germany and the Netherlands, Japan, UNDP, Italy, France, the Arab Fund for Economic and Social Development, the Islamic Development Bank, the World Bank/IDA have supported investment in water and agriculture. Activities supported by these donors includes:

(i) The main strategy currently in place to sustain the water sector is the Water Sector Support Project (WSSP), which brings together approximately $300 million in resources. The WSSP represents a visionary and comprehensive long-term approach to transforming and managing the water sector more sustainably. The proposed DPG will act as an additional enabler for the WSSP by making a number of strategic inputs to the policy environment that will address critical barriers currently impeding the full and effective implementation of the WSSP in areas related to increasing resilience to climate change.

(ii) The government water strategy is defined by the National Water Sector Strategy and Investment Program (NWSSIP), which is closely harmonised with the WSSP development objectives. NWSSIP will be the main framework to guide additional investment in the sector designed to address the risks of climate change to water and agricultural development in the country.

5. However, the investments under WSSP and NWSSIP that are intended to improve Yemen's water

management and water availability to various communities and economic activities would require further support to resilience to climate change. Several studies have confirmed that these indicators are at risk of further decline because of challenges produced by climate change and climate variability, which underlines the urgent need for a concerted effort to increase resiliency to climate change.

6. Both the WSSP and NWSSIP concur that decentralisation of authority over water management will be an important component of the effort to increase resiliency of the sector. The development objectives of both strategies have endorsed increased decentralisation of the role of the National Water Resources Authority (NWRA) and to strengthen bottom-up management of water resources through strong partnership with local communities and water groups at the watershed level.

7. The call for a decentralised approach has recently been echoed by a broad coalition of government and civil society organisations. In January 2011, representatives of the Government of Yemen and civil society held a National Conference on Management and Development of Water Resources70. The result of this conference put forward the Sana'a Declaration on the Yemeni Water Partnership, which urges a more partnership-based approach, with greater decentralisation of authority, integration of water planning, and conservation measures. Though the Sana'a Declaration does not mention climate vulnerability or climate change specifically, its recommendations are important because the measures it proposes will help to improve the resiliency of the water sector overall.

8. Devolution of water management authority to the level of the communities, WUAs, and the drainage basin is expected to improve the effective management of the resource because it places the capacity to act closest to the resource itself and to its users. This in turn makes it possible to harness local knowledge and increase participation of communities in the management of the resources on which they depend.

9. The benefits of devolution could strengthen measures to ensure women's representation and participation at the community level, and would have a positive influence on gender balance in the communities in question. Another expected benefit will be to help insulate gains made in climate resilience from unstable security situations in the country

(B) DEVELOPMENT AND SPECIFIC OBJECTIVES

10. The primary development objective of the ICRWS is to support the Government of Yemen's efforts to improve climate resiliency and thereby promote sustainable long-term growth and protect vulnerable populations. Climate resiliency of the water sector is an essential part of the future climate-resilient development pathway for Yemen, as water underpins main critical functions of the society and the economy.

11. The specific objectives of the ICRWS are:

(iv) To strengthen the policy environment toward climate-resilient water development strategy by enacting legislative and institutional reforms.
(v) To support central and local institutions engaged in the water sector improve their capacity in advancing modern technology and management practices to sustain the development of the water sector. This objective would have a multiplier effect by which increasing resiliency of the water

[70] Yemeni Water Partnership. (2011). *The Sana'a Declaration on the Yemeni Water Partnership.* National Conference on Management and Development of Water Resources in Yemen. Sana'a, January 17, 2011.

sector to climate change in turn contributes to the climate resiliency of local communities, agricultural systems, and rural livelihoods through strong participation of local governments, water groups, civil society and the private sector.

(vi) To establish a common financing mechanism for future climate and risk resiliency projects through the improvement of water information and data systems, improvement of flood control and watershed management, increase the efficient use of water for irrigation, and improve water supply for domestic use.

12. This operation would support and complement the five development objectives of the NWSSIP which are: (1): Strengthen institutions for sustainable water resources management; (2) Improve community-based water resource management; (3) Increase access to water supply and sanitation services; (4) Increase returns to agricultural water use; and (5) Improve the overall management and protection of groundwater resources through rational control and monitoring of abstraction in critical water basins.

13. The expected outcomes of the this investment are:

1. Improvement in awareness of water management issues and climate risks among government decision-makers, civil society organizations and among the general public
2. Strong participation of local communities and water groups including WUAs in implementing risk management procedures designed to incorporate climate change risks in the management and utilization of water resources at the local level.
3. Mainstreaming of climate resiliency considerations into national development planning, to include the 4th DPPR, and the 2009-2015 NWSSIP.
4. Creation of new financing mechanisms to channel funds to climate and risk resiliency projects.

(C) KEY INDICATORS AND BASELINE

14. Key indicators will include:

- Improvement in awareness of water management issues among (a) government decision-maker; (b) civil society organizations; and (c) the general public.

- Strong participation of local communities and water groups including WUAs in implementing risk management procedures designed to incorporate climate change risks in the management and utilization of water resources at the local level. The participation would be monitored through indicators related to the adoption of new policies and community collective actions and in introducing new technologies and regulations related to sustainable management of ground water, adoption of new technologies for efficient use of irrigation, of watershed management, and of flood control.

- The capacity of the local level institutions including water groups and water users associations (WUAs) to manage their water resources must be brought into play to make the best of communities' advantages at the small scale, while working in partnership with NWRA and the national authorities. This may be achieved through devolution of responsibility to the basin committees and water user associations (WUAs), with NWRA monitoring the national scale and playing a coordinating and knowledge management role from the centre.

- Strengthen government water polices and related regulations to ensure rational control on the

use and development of groundwater and the efficient use of water for irrigation. Measures under consideration include investment in better management of flood control, in enhancing efficient of watershed management though strong community participation, in advancing modern irrigation systems at the farm level, and increase the use of treated waste water through advances in treatment technology within carefully prepared rules and regulations to safeguard health and sustainable production systems

- Mainstreaming of climate resiliency considerations into national development planning, to include the 4th DPPR, and the 2009-2015 NWSSIP. This includes mainstreaming resiliency to climate change in development planning in:
    - Fourth DPPR amended to include climate resiliency as one of its overarching goals
    - NWSSIP and WSSP amended to include climate resiliency of the water sector as one of its central goal.
    - Capacity building, awareness-raising and training programs implemented for government, civil society organizations, and communities (including WUAs and basin committees).
    - Establishment of funding mechanism for climate and risk resiliency. Ability of the new funding mechanism to attract investment from donors will be an important indicator

(D) ANTICIPATED COMPONENTS AND ACTIVITIES INCLUDING LEARNING AND KNOWLEDGE MANAGEMENT ACTIVITIES

15. There are five components:

(1) Enhance existing country-wide water information and data system to become responsive to climate change. This component will strengthen the government's capabilities in updating the contribution of climate related information systems to development planning and risk management and early warning systems. It will support a national network of information and data gathering and analysis related to climate change and in preparing periodical reports about the implications and risks of climate change on the water sector and related economic activities in agriculture and rural development.

(2) Support the development of water policies and related structural changes that would enhance the current NWSSIP/WSSP programs in dealing with water variability and scarcity. This component would improve the capacity of local institutions to manage water resources while working in partnership with NWRA and the national authorities. The grant will assist in the gradual devolution of decision-making and action to the basin committees and water user associations (WUAs), with NWRA monitoring the national scale and playing a coordinating and knowledge management role from the centre.

(3) Improve management of watersheds, flood hazards and risks, and groundwater conservation. Flood protection of infrastructure, agricultural and habitation is an important dimension of climate resilience. The new approach proposed is to develop and scale up modern technology and improved water management practices beyond the current focus of better managing of spate flows for direct use in agriculture. This component would build on already established field activities by WSSP and NWSSIP to provide additional funds to selected communities to assist them prepare special programs designed to better manage and utilize flood water through community action, local participation and self-help groups. The grant would support the testing of pilot models for managing floods with the objective of protecting vulnerable communities and their assets, protect natural resources, and increase groundwater recharge. Technology improvement of water harvesting and storage to increase the recharge of local aquifers would be accompanied by improving controls on groundwater use and support for local governments, agencies and communities to enforce laws designed to curb illegal

drilling of tube wells in participating watershed areas. Farmers in vulnerable areas would be targeted with assistance to improve efficient use of scarce water through the adoption of modern irrigation technology, improved on-farm water storage capacity, and responsive water-efficient high value crops and production systems.

(4) Increase the efficient use of reclaimed wastewater. In an effort to address the mounting challenges of increasing water scarcity as result of climate change, this component would support pilot schemes designed to collect and treat and recycle wastewater to supplement local irrigated agriculture. The component would provide funds to participating communities to invest in advancing technologies and infrastructure needed to enhance the collection, treatment and reuse of recycled water for agriculture or environmental services. The component would also provide funds to strengthen local institutions, regulations and policy planning to ensure that the increasing use of treated and recycled waste water is monitored regularly to avoid any potential risk to human or animal health or to the environment.

(5) Project management and monitoring of impact. The DPG will include measures to support the participating agencies establish a project management unit to implement the project. PMU include project manager supported by experts in finance, monitoring and evaluation, capacity-building of communities, and communication and training.

16. The DPG utilizes a results-based systems of disbursement that will be conditioned on the completion of five prior actions:

- Establishment of a system of rewards for WUAs for contributing to improved demand-side water governance as part of IWRM), based on performance metrics (e.g. proportion of wells metered and monitored), and implementation of a program of public awareness and education on water resource management, and prevention and reporting of illegal drilling and monitoring of water tables. The support to capacity building at the WUAs level would ensure that the grant would avoid the traditional top-down approach that controls the cash flow and tend to be where most decision are made. The grant would support capacity building of local water groups who may include WUAs, or more general groups concerned with water use which would include rural water supplies and domestic use. This support would allow for a special attention to the role of women and would support holistic understanding of how to manage of water resources at the local level in light of the increasing of climate change.
- Strengthen rules and regulations and relevant legislation to give legal mandate for water law enforcement and implementation to local communities for the purpose of improving the governance of both water supply and water demand through WUAs/basin committees. This would be monitored through timely decentralized responses to the national illegal drilling hotline, and creating and publicizing a public accountability mechanism to publish the names of the best and worst performers in terms of effective and efficient water management.
- Strengthen government commitment to regulate and prepare systematic procedures to monitor the operations of the private sector through licensing and metering of drilling contracts and services. The government in close cooperation with WUAs would regulate the contracting of private sector and the commissioning of drilling equipment and monitor their use in well defined locations.
- Provide training and capacity building for both public agencies and community based groups in flood control management including early warning systems and emergency planning and implementation. The project will coordinate these activities with existing WUAs and other community based organizations and local self help groups.
- Strengthen partnership between public agencies and community based groups and civil society. The new approach proposed for water management would be based on strong partnership between communities and the government, in which authority for water management is devolved from central agencies to the level of the catchment basin, and which takes climate resiliency explicitly into account as one of its objectives. In order to enable this new approach, some

structural changes are needed to allow the NWSSIP/WSSP programs to respond to strengthen this partnership.

(E) INSTITUTIONAL ARRANGEMENTS

17. The institutional arrangements would involve different levels of public and local agencies. These arrangements would require strengthening cross-sectoral coordination within the country and establishment of operational links between national and local agencies concerned with climate change and the resilience of water and agriculture. These links should also include support structures with local communities and the private sector

18. Implementation of the prior actions will be the responsibility of the Ministries of Water and Environment in cooperation with the Ministry of Agriculture and Irrigation – as appropriate to each of the prior actions. The preparation of a Poverty and Social Impact Analysis (PSIA) has been initiated and will be completed during project preparation. The PSIA will ensure that the impact of the planned actions to be taken under the DPG on the poor and on the social fabric of the country as a whole will be positive. Any changes to the design of the DPG recommended as a result of the PSIA will be incorporated during the preparation stage.

(F) RISKS

19. There is a substantial risk to inaction. Yemen is a country with limited water resources and high vulnerability to climate change in critical sectors. Action to increase resiliency needs to begin now. There is the risk that the 4th DPPR and the NWSSIP proposed update (currently in preparation extends to 2015) may not include special features designed to address climate change. If the opportunity to include climate resiliency at the core of national development planning is missed, at least four years will be lost during which time scarce national resources will be spent without consideration of climate vulnerability and climate resilient development may continue only in piecemeal fashion. The present moment is critical: seizing the moment of the launch of these two major national strategies to "lock in" the climate resiliency agenda for the imminent and future planning cycles will allow the important and long-term work of increasing Yemen's resiliency to climate risk to begin immediately.

20. There is a risk that government and concerned institutions may lack the capacity to sustain the changes made by the prior actions (e.g. the incorporation of climate resiliency in future iterations of development planning). This risk could be addressed by the ongoing capacity building and reinforcement as part of the other investments under the DPPR, WSSP/NWSSIP and SPCR.

21. The PSIA will identify risks and potential impacts during the preparation stage of project development. Any recommendations flowing from the PSIA will be incorporated prior to assessment.

(G) INVESTMENT COSTING

COMPONENT	**COST** (US$ million)
	PPCR
1. Water information and data system	2.50
2. Water policy and support for local water institutions	2.00
3. Efficient flood control and management of watershed	11.50
4. Increase the efficient use of recycled wastewater	5:40

5. Project management and monitoring of impact	2.00
Contingencies (5%)	1.60
Total	25.00

(H) RESULTS AND PERFORMANCE FRAMEWORK

General Objective	Outputs	Outcomes	Critical conditions
Improve the capacity of central and local institutions in managing the water sector in light of increasing risk of climate change on already difficult situation of water scarcity in several vulnerable communities and economic activities	Systematic engagement in updating policy and institutional reform and financing development projects at local and central level Improve the policy framework and development planning responsive to climate change and strengthen resilience of water sector and related institutions to climate change	Increase the number of local water groups and institutions participating in actions designed to better manage the water sector.	Security and political stability in the country Government continues its engagement with national priority programs Government commitment to implement the NAPA Decree

Component	Outputs	Outcomes	Indicators	Critical Conditions
Component 1: water information and data systems	Network of information centers in selected provinces and governorates covering the main weather zones in the country. Development of capacities of	Periodical reports on risk analysis and procedures to update warning system related to drought, floods, and mitigation of climate change Improve capacity of local institutions and participating agencies in collecting and updating weather information related to water and	Number of office established Quality of reports produced Utilization of reports in shaping policies and regulations and actions. Public awareness of water resource management issues increases	Stakeholders are willing to participate in decisions concerning zoning and management plans Participation of local institutions in implementing the new information service.

Component	Outputs	Outcomes	Indicators	Critical Conditions
	governorates in collecting and analyzing information and data related to climate-resilient water management decision in the selected governorates	impact on economic activities. Increased capacity of local practitioners to generate localized, downscaled climate change models, and established linkages with the future climate information		
Component 2: Enhance water policy and regulations	Capacity to conduct decentralized monitoring and enforcement has increased	Programs initiated under NWSSIP include climate resiliency measures in their design	Communities have effective system of incentives for sound IWRM, Continuous public education becomes part of WUA and NWRA mandate	Local Security and willingness of water agencies to revise existing policies and regulations. Political risk of downgrading impact of climate change on policy formation
Component 3: Flood control and better management of	Improved water harvesting, reduce risks of floods, and	Improved water structure to manage floods and recharge ground water, improve	Number of pilot flood control structure requested by participating	Weak community participation, lack of government support for devolving investment options to local communities, and conflict between upstream and downstream communities on risk of fled control and use

Component	Outputs	Outcomes	Indicators	Critical Conditions
water sheds	protect assets and communities from flood, and collective participation among participating communities in watershed management	water supplies to local communities, and reduce runoff and protect soil and crops, WUAs have increased their capacity and can conduct effective local monitoring and law enforcement Communities take primary responsibility for integrated management of their own water resources. Development practices become more climate resilient nationwide through better integration of climate resiliency measures in national planning Funding for common risk financing platform is stable and sustainable and continues to attract contributions from existing and new donors	communities, contribution of local communities to better management of floods and water shed, number of famers who adopt modern irrigation technology, quality improvement in irrigation services and in increasing productivity among farmers in participating communities.	of water.

Component	Outputs	Outcomes	Indicators	Critical Conditions
Component 4: increase the efficient use of reclaimed recycled water	Increase water availability to farmers, Reduce Improve polices and regulations related better utilization of waste water	Increased use of recycled water for agriculture and environmental services,, Improve technology of collection, treatment and application.	Volume of added water supplies for agriculture, increase participation of communities in the collection and utilizations	Environmental risks, cultural risks and social resistance and impact on prices and values of agricultural commodities grown under recycled wastewater.

Annex A: Detailed Project Description

1. The ICRWS project is designed to complement efforts planned to strengthen the national and local capacity in addressing challenges of climate change on the water sector and its implication of rural development and poverty reduction in Yemen. This effort is closely planned with other initiatives designed to upgrade the knowledge base of climate change through investment in upgrading the scientific framework of climate data and weather information systems at the national level and at the local micro climates as determined by the agro-ecological zones in the country.

2. Investment in enhancing weather related information systems should be accompanied by investment in improving local capabilities in translating such information into policy planning, educational and extension activities to motivate local communities to participate in collective actions and development programs to support both household and local and national adaptation strategies.

Component 1: Establish country wide water information and public education system responsive to climate change at the local levels (US$2.5 million).

3. A reliable weather information system is essential for informed responsive policy planning and associated development programs. This component will strengthen the government capabilities in updating the contribution of climate related information systems to informed policy and action plans. A major objective is to strengthen the collection of information needed to improve national and local agencies improve risk management and early warning systems for vulnerable communities and rural households. It will support the establishment of a national network closely connected to outreach centers of at the local level designed to collect information and data on regular basis to conduct scientific analysis related to climate change and its implications on locale water conditions. This network would prepare periodical reports on changes in major climate indicators such rainfall, runoffs, floods, temperature, drought frequency and duration and shifts in historical records in terms of important weather data. This work would be complemented by careful analysis of the implications and risks of climate change on water availability and recharge of local and regional aquifers, and would monitor the implications of changes in the water situation on related economic activities in agriculture and rural development.

4. The component would support the establishment of offices in the Environment Protection Department to be linked to local information network with regional offices in the selected four governorates to provide science based weather data and information. The national and regional offices would be equipped with modern weather data instruments supported by computer modeling to be calibrated with local and national weather monitoring systems. The component would also provide funds for adequate training and capacity building related to data collection, analysis and reporting on periodical basis on weather changes and implications on local conditions. These reports would also be used to develop education and extension publications to update local communities about weather related activities and to increase the participation local development agencies and rural households in risk management and early warning systems and associated development activities designed to improve the resilience of the water sector to climate change.

Component 2: Enhance water policy and regulations and support strong partnership with local water institutions to increase resilience to climate change (US$ 2.0million)

5. In order to enable this new approach, the development policy grant (DPG) will support the development of water policies and related structural changes that would enhance the current NWSSIP/WSSP programs in dealing with water variability and scarcity. This component would improve the capacity of local institutions to manage water resources while working in partnership with NWRA and the national authorities. The grant will assist in the gradual devolution of decision-making and action to

the basin committees and water user associations (WUAs), with NWRA monitoring the national scale and playing a coordinating and knowledge management role from the centre.

6. This component would closely coordinated with component 1 to ensure strong links are established between policy planning at the national level is supported by locally relevant application and implementation in selected governorates. The component would support WUAs at the local level to increase their contribution to policy planning through active debates and discussions of policy issues presented in NWSSIP/WSSP and to ensure that such issues are also endorsed by farmers groups and local communities. The component would support a bottom up approach to policy planning through related to increasing the resilience of the water sector to climate change through policy workshops and field studies involving WUAs and local leaders. The component would also assist local communities to establish policy groups to correspond with specialized agencies at the governorate level about priority actions needed to strengthen productive partnership between public agencies and vulnerable communities concerned with planning and implementing development programs designed to increase adaptation of water and agriculture to climate change.

Component 3: Improve management of watersheds, flood hazards and risks, and groundwater conservation (US$ 11.5 million):

7. This component would support development and implementation of participatory watershed planning process. Because flood protection of economic resources and habitation is an important dimension of climate resilience, the component would support project inputs in a coordinated approach to ensure scientifically planned water catchments on private lands, on common lands owned by local authorities such as forests and protected areas.

8. A new approach is needed to develop and scale up modern technology and improved water management practices beyond the current focus in Yemen that is concerned with better managing of spate flows for direct use in agriculture. Both technology improvement of water harvesting and storage to increase the recharge of local aquifers would be accompanied by improving controls on groundwater use. The grant would support the local governments and agencies to enforce laws designed to curb illegal drilling of tube wells in participating watershed areas. The grant would support the testing of pilot models for managing floods with the objective of protecting vulnerable communities and their assets, protect natural resources, and increase groundwater recharge.

9. This component would provide funds to finance a comprehensive and systematic process of social mobilization and community level institution building to underpin a participatory planning and subsequent plan implementation which would encompass local infrastructure to improve water conservation with active participation of selected communities at micro-level watershed levels. The components would support participating communities to prepare special programs designed to build community based groups and social organizations technically trained to better manage and utilize flood water through community action and local participation. The component would fund local schemes to construct farm ponds, drainage lines, boulder checks, field bunding, minor tanks and planting green cover to prevent soil erosion. The local communities would be trained to utilize thematic maps for micro-watershed planning. Training for local communities would also include how to apply technical information collected under component 1 such as hydrological modeling and ground water assessment to support local initiatives in watershed planning.

10. The programs include support to establish self-help groups in participating communities and to provide them with funds needed to build infrastructure for water catchment, for recharging local aquifers, and for protecting soils and farm assets through well designed watersheds and related structures. The component would support activities carried out by the participating communities through incentives to

prepare and implement collective actions needed to develop and improve control and utilization of flood water. The project would support the establishment of self help groups and farmers groups who would benefit from special training and capacity building to be provided under component one described above.

11. Under this component funds would be provided to encourage farmers in vulnerable areas to improve the efficient use of scarce water for irrigation through the adoption of modern irrigation technology. The program will assist poor farmers through carefully designed pilot schemes in scarce water communities upgrade their irrigation network to manage frequent drought by improving on-farm water storage capacity, by using efficient irrigation networks, and by selecting responsive water efficient high value crops and production systems.

Component 4: Increase the efficient use of reclaimed wastewater (US$ 5.4 million).

12. In an effort to address the mounting challenges of increasing water scarcity as result of climate change, this component would support water reclamation and reuse of recycled wastewater. The component would provide funds to participating communities to invest in decentralized water reclamation and reuse. The component would support a spectrum of decentralized wastewater treatment and reuse plans for small, medium and large communities. The component would include a phase to assess the level of public acceptance of use of recycled water and biosolid for agriculture and landscape and forests. The component would finance testing of the design of wastewater treatment plans according to agreed protocols with participating communities regarding the potential for final reuse which would influence the selection of the treatment process, level of quality control, and risks of application. The component would finance feasibility studies several options for use of water, soils and hydrology and proposed technology. The component would also finance investment to advance technologies and infrastructure needed to enhance the collection, treatment and reuse of recycled water for agriculture or environmental services.

The component would also provide funds to strengthen local institutions, regulations and policy planning to ensure that the increasing use of treated and recycled waste water is monitored regularly to avoid any potential risk to human or animal health or to the environment.

Component 5: Project management and monitoring of impact (US$ 2.0 million).

13. The DPG will include measures to support the participating agencies establish a project management unit to implement the project. The PMU includes a project manager supported by experts in finance, monitoring and evaluation and communication and training. The outcomes of this DPG will reinforce specific planned outcomes of the NWSSIP.

Improving Rural Livelihood Through Adaptation in Rain-fed Agriculture Project

(IRLARA)

Concept Note

INVESTMENT III

(A) BACKGROUND

1. The analysis and consultations carried out under the Phase I of the PPCR program in Yemen highlighted the linkages between climate risks, soil and water conservation (SWC) and rural livelihoods. Similarly, several analytical studies[71] show how improved land and water management, combined with social protection and other risk reduction measures, provides the basis for climate resilient growth and poverty reduction. With 90% of the rural households involved in some agriculture and livestock production, climate resilient rural strategies are a key. These challenges have been recognized in key development planning documents – such as the Fourth Five-Year Socio-Economic Development Plan for Poverty Reduction (2011-2015) and Rural Development Strategy (2005). Also, the National Adaptation Programme of Action (NAPA) has identified agriculture and food security as one of the main vulnerable sectors in Yemen. According to the NAPA climate change may imply deterioration of landscapes, watersheds and terraces, which negatively affects agricultural incomes for local communities specifically and leading to national food insecurity as food production levels change.

2. The joint intervention by the World Bank and IFAD "Rainfed Agriculture and Livestock Project" (RALP), aims to contribute to the higher development objectives of reducing poverty in rural areas and improving natural resource management. It was designed to enable poor rural producers in rainfed areas to: (a) improve their production, processing and marketing systems: (b) protect their assets: soil, water, rangeland, seeds and animals; and (c) get organized for the purposes of the two above. More specifically, its component 3, implemented by the Social Fund for Development (SFD), on productive rural development is expected to help producers upgrade and diversify their agriculture and livestock production, processing and marketing systems, and better conserve soil and harvest water in the Uplands. Mobilization of rural communities and producer groups is at the core of this component, either through provision of facilitators and technical advice to local producers (male, female, youth) to help them become organized, and indirectly through farmers groups implementing sub-projects of their choice, with technical and financial support from the project. IRLARA will use the same RALP "philosophy" and build on this experience in training and raising awareness of local communities in building their climate resilience.

3. RALP progress so far: In its first 3 years of project implementation, RALP has initiated its activities in 5 governorates (Hajjah, Al-Mahweet, Hodeidah, Lahej and Sana'a) and 23 districts. The project greatly contributes to preserve Yemeni agro-biodiversity with the collection of 1,775 landraces of which some 1,300 have already been conserved at AREA gene bank and characterized. Collaboration between farmers and researchers is on-going to improve local varieties and General Seed Multiplication Corporation (GSMC) has begun demonstrating the value of seed improvement among farmers, under rainfed conditions. The project has also contributed to the production of a new Yemeni vaccine to protect poultry, to the publication of a paper on livestock policy and strategy, to the training of 49 Community Animal Health Workers to improve animal health conditions at the community level, to the rehabilitation and equipment of the Central Veterinary Laboratory in Sana'a as well regional laboratories in Ta'iz, Abs and Hodeida. Two hundred and thirty communities in 23 districts have received support from the project; 2,182 producer groups have been formed, and 2,161 sub-projects funded, mostly in livestock production and bee keeping (77%) but also seed producer groups and others. Among these groups about 30% of the households are headed by women and overall women participation in various project activities is targeted to reach as many as possible. Additionally, the mid-term review of the project has suggested that women

[71] Yemen: Assessing the Impacts of Climate Change and Variability on the Water and Agricultural Sectors and the Policy Implications, the World Bank (2010). Report No. 54196-YE. Coping Strategies in Rural Yemen and Policy Implications, the World Bank (2010). Report No. 251927-YE

representation in Community Producers' Committees should be a condition for the second and third round of funding.

4. With regard to soil and water conservation, the SFD Agriculture and Rural Development Unit (ARDU) water team is implementing three types of interventions: (i) soil and water management subprojects at local community level, (ii) integrated management for terraces rehabilitation and water harvesting at inter-community (district) level, and (iii) watershed management projects at governorate level. All these interventions are based on actual watersheds (micro, medium and macro) within the relevant administrative structure. The objective of the IRLARA is to complement existing soil and water conservation activities under RALP by adding climate considerations into the planning and implementation, e.g. by considering short and long term climate risks and using different types of mechanisms of intervention to target different vulnerable groups.

5. **Rationale and value added**. The rationale behind the proposed IRLARA is to build on the participatory processes and institutional mechanisms established by the RALP project to scale up and mainstream climate resilience into local development planning and implementation. The proposed project will adopt an integrated approach combining soil and water management for climate change adaptation and enhanced provision of ecosystem goods and services; social protection through diversification of livelihood options; and community- based disaster risk management for improving the preparedness to respond to climate induced hazards, thus addressing climate and other risks at local level. It will support, strengthen and help scale up current best practices and help disseminate them among the most vulnerable populations living in areas with high climatic risk, with a special focus on the situation of on women, youth and chronically poor. All three approaches, climate change adaptation, social protection and disaster risk management, are linked by a fundamental concern with reducing vulnerability and building resilience – to poverty disasters and to changes in average climate conditions. The project aims to employ (i) *protective measures* to provide relief from deprivation (e.g. food price shocks, droughts), *preventive measures* designed to prevent deprivation (early warning systems) and *promotional measures* aimed at enhancing income and capabilities (e.g. income generation activities). This combined approach aims to focus on the social and institutional dimensions of vulnerability in addition to the technical and ecological aspects and tailor the interventions to address sometimes very different drivers of vulnerability.

6. The project would also have a special focus on the cross-cutting elements of the PPCR in Yemen: (i) awareness: project will include a special component on awareness- raising for governmental and non-governmental stakeholders at sub-national levels, focusing on different groups of stakeholders (decision makers, farmers, Water User Associations, youth etc), (ii) gender: the gender focus will be addressed both through mainstreaming gender in the project design as well as specific gender initiatives such as income generation activities and mobilization of women farmers, (iii) private sector will be engaged, in consultation with the IFC, in agro-business activities, and (iv) education and research by organizing targeted training events for different groups of stakeholders.

7. In working with women, IRLARA will take into consideration gendered divisions of roles and responsibilities; and develop actions based on needs, constraints, risks and opportunities. Yemeni women play a significant role in rural livelihoods and female farmers contribute to over 85% of plant production and 95% of animal management (Governorate Preparation Report 2004). Shifts in the agricultural production system from subsistence to cash cropping, coupled with continuing male out-migration, is leading to the feminization of subsistence agriculture and puts rural women at a significant disadvantage. Climate change is expected aggravate the situation as women are directly affected by environmental degradation and increasing water and fuel scarcity. Women also have less capacity to respond to changing economic circumstances or to withstand any shocks, including those brought on by climate change. More specifically, IRLARA will focus on improving women's participation at local level by using quotas for

women's representation coupled with gender training to ensure men's support, and reducing logistical barriers to women's participation by convenient meeting locations, schedules and transport; building capacity to help individual women, women leaders, women's organization and gender-focused NGOs become more effective participants, especially in local planning and water governance.

(B) DEVELOPMENT AND SPECIFIC OBJECTIVES

8. The project will contribute to the *transformational change* of the PPCR program in Yemen by (i) scaling up the soil and water conservation efforts through introduction of integrated watershed management approach working with local Water User Associations and linking it to the proposed National Irrigation Programme (NIP); and (ii) scaling up geographically to include new governorates. IRLARA will build on the success of "*RALP philosophy*" in engaging local communities and facilitating local planning while adopting a *comprehensive and combined approach* to manage different factors contributing to the vulnerability of local communities

9. The project development objective is to *improve the resilience of local populations to climate risks through*

(i) investments in soil and water conservation, using the integrated watershed management approach and piloting Payment for Environmental Services (PES);
(ii) creation of alternative income opportunities through promotion of livestock production and lucrative value chains; and
(iii) developing integrated community risk management mechanism, including social protection and disaster risk preparedness measures.

10. The expected outcomes/impacts are:

- Improved ecosystem stability and provision of goods and services through integrated watershed management approach
- Labor opportunities for locals
- Improved water conservation at local level through groundwater management and water harvesting
- Diversification of income and livelihood strategies
- Improved risk management capacity and preparedness of local communities.

(C) KEY INDICATORS AND BASELINE

11. The following indicators will be used to evaluate project progress toward achieving the development objective:

(i) Number of communities adapting integrated watershed management planning
(ii) Number of communities incorporating climate resilience measures, such as improved water harvesting techniques and terrace rehabilitation plans, into local development plans
(iii) Number of communities in climate-vulnerable regions incorporating social protection measures in their development plans. These include specific measures to protect the poorest and most vulnerable (women, elders) through traditional community-based mechanisms such as mutual funds
(iv) Water resource management indicators: slow-down of run-off, % of rainwater infiltrated, improvement in the soil moisture content
(v) Number of community based early warning system plans developed and adapted in the community development plans

(D) ANTICIPATED COMPONENTS AND ACTIVITIES

12. The proposed project will consist of four inter-related components, which will be implemented within a time frame of five years (2012-2016). ***Please see Annex 1 for Detailed Project Description.***

Component 1: Climate resilient soil and water conservation investments.

13. This component aims to improve the climate resilience of the watersheds based ecosystems in the rainfed areas of Yemen through (i) integrated soil and water conservation measures at the watershed/basin level, (ii) community mobilization and training to build local capacities to manage water and other natural resources in an integrated and sustainable manner, and (iii) Piloting Payment for Environmental Services (PES). IRLARA will adopt an Integrated Watershed Management (IWM) approach for ecosystem management, which provides a framework to integrate natural resource management with community livelihoods in a sustainable way by focusing on the sustainability of ecosystem services as well as sustainable benefits for human well-being. The IWM approach focuses on the watershed level, cutting across administrative districts, through formulation of a Comprehensive Watershed Management Plans and implementation of inter-community and district level sub-projects. As part of its community-based approach, the project will work with Water User Associations in developing capacities of local councils and communities to manage water resources (including groundwater) and to include climate resilience in local and community planning. This is complementary to the *Climate and Risk Resiliency Measures* intervention under the PPCR program in Yemen. Special focus will be given to building capacities and raising awareness for inter-community planning and action, as part of the investments for integrated watershed management, e.g. promoting coordination between communities covering upper and lower watershed management. Under this component IRLARA will also pilot PES to encourage investments in terraces rehabilitation and other eco-system maintenance activities. This pilot needs careful design, including the establishment of exact services that the work provides, as well as the structure for transferring the payment.

14. IRLARA aims to work through existing decentralization structures in developing capacities of local councils and communities to manage water resources (including groundwater) and to include climate resilience in local and community planning. It will focus on improving local water governance through community mobilization and working with National Water Resource Authority (NWRA) and local councils on water management aspects. Special focus will be given to building capacities and raising awareness for inter-community planning and action, as part of the investments for integrated watershed management, e.g. promoting coordination between communities covering upper and lower watershed management.

15. Under this component IRLARA will also pilot PES to encourage investments in terraces rehabilitation and other eco-system maintenance activities. This pilot needs careful design, including the establishment of exact services that the work provides, as well as the structure for transferring the payments

Component 2: Improving livelihoods through productive rural investments.

16. Building on the existing initiatives by Social Fund for Development (SFD), IFAD, the World Bank, and the IFC this component will aim to develop innovative and productive rural investment channels and opportunities for farmers and community-based organizations, with a special focus on women. IRLARA will scale-up existing RALP initiatives for providing seed money and technical assistance for small income generation activities (handicrafts, beekeeping, etc). Additionally, the project

will build on the experience of the Agrobiodiversity and Climate Adaptation project (ACAP), to offer communities a practical way of alleviating poverty through the sustainable use and conservation of agro-biodiversity resources by financing small, sustainable projects run by farmers in the targeted rainfed areas.

17. As part of the multi-focal approach to climate resilience at local level, IRLARA will support livestock activities for improving adaptive capacity of local populations. This is complementary to integrated watershed management under component 1 (rangeland management improves upper catchment vegetation and livestock productivity) and risk mitigation activities under component 3 (the role of livestock in securing local livelihoods in the face of climate hazards). Additionally, IRLARA will support producers in building value chain for valuable products, such as honey, coffee and livestock. By providing alternative sources of income through improved market access and focusing on products with lucrative value chain, the project aims to improve the adaptive capacity of farmers through vertical expansion of their livelihood options.

Component 3: Integrated community risk management.

18. Rural communities in Yemen are faced with several risks and a holistic approach is needed to address their vulnerabilities. The project will adopt a comprehensive approach to improving resilience, combining initiatives in disaster risk management, climate change adaptation and social protection. This component will explore opportunities for piloting innovative activities on social protection and 'risk pooling of agricultural and livestock production', such as traditional solidarity mechanisms, as well as institutional capacity building for establishing an early warning system in support of climate resilience related initiatives. The main expected outcome is improved adaptive capacity among poor and vulnerable groups and reduced social vulnerability among the communities, through targeted interventions that strengthen the interaction between economic growth and social inclusion.

19. This component will be prepared in coordination with RALP and other relevant units/programs of the Social Fund, such as Labor Intensive Work Program and micro-finance unit. The idea is to broaden the scope of available "instruments" currently in use in the RALP, to include protective measures, such as cash for work to implement community sub-projects for integrated watershed management with the RALP philosophy. This helps to target the most vulnerable groups and communities' living in chronic crisis situation and climate hazard prone locations. In addition, the objective is to revitalize some of the traditional risk mitigation measures and incorporate them into the early warning system as part of community development plans. This type of programs, once established can operate as productive safety net program that can be scaled up to respond to shocks of various kinds, such as crop failures or other natural disasters.

Component 4: Strategic Knowledge management and Project coordination.

20. This component includes collecting and documenting local best experiences and indigenous knowledge on activities improving climate resilience at local level, their dissemination in coordination with relevant local and national stakeholders as well as promoting to incorporate them into national and sub-national policies and strategies. This knowledge management component will be carried out in coordination with PPCR coordination unit at EPA. Additionally, inter-institutional coordination with the MAI is essential to make sure that the planned activities are in line with the proposed National Irrigation Program (NIP).

21. Project Coordination: The Agriculture and Rural Development Unit of the Social Fund for Development will be in charge for project implementation and coordination with other SFD units as well as with other institutions responsible for implementing the SPCR

(E) INSTITUTIONAL ARRANGEMENTS

22. IRLARA aims to improve inter-institutional coordination, both at national and local levels, in integrated watershed management and mainstreaming climate resilience into local development planning. The Agricultural and Rural Development Unit of SFD will implement the project through its project officers. This integrated approach means that the project will be implemented together with the Labor Intensive Work Program and Integrated Intervention Approach units within the SFD to enable the use of variety of mechanisms for targeted interventions in addressing communities' needs and vulnerabilities.

23. The Agricultural and Rural Development Unit will also benefit from the support from SFD units as needed, in particular, the Training and Organizational Support Unit, the Community Contracting Project, the Water and Environment Unit, the Microfinance Unit, the Administration and Finance Unit and the M&E Unit.

24. At the national level SFD will coordinate with the Ministry of Agriculture and Irrigation (MAI) to ensure inter-institutional coordination, especially regarding the linkages between the proposed *National Irrigation Program (NIP)* and the activities related to the local water governance through Water User Associations. SFD will also coordinate with the Environmental Protection Agency (EPA), as the national coordination entity for the PPCR program in Yemen, to make sure that lessons learned and best practice from IRLARA are incorporated into the national climate strategies and programs. Strategically, it is important to ensure coordination of efforts among various actors to guarantee sufficient knowledge management. At the governorate level, SFD staff and local consultants, resource persons, and NGOs /agencies, men and women, to be contracted by SFD will supervise and manage operations. The proposed Project Preparation Grant (PPG) will develop the detailed implementation arrangements and identify required capacity building/strengthening measures. This will be undertaken in a participatory process with all concerned government and non-government stakeholders.

(F) RISKS

25. Key envisioned risks to the achievement of the project objective are the following:

(i) Political instability and security risks: Lack of security and political stability in the country and the rain-fed areas in particular, affecting the entire Yemen portfolio. *Mitigation:* Implementation of activities is expected to take place at different levels in order to minimize reliance on central government.

(ii) Institutional risks: (a) Limited understanding of the linkages between climate resilience and disaster risk management by Yemeni decision makers and other stakeholders at various levels. Mitigation: Initial capacity building and awareness raising efforts are being undertaken by the EPA on various levels under the Phase I of the PPCR program in Yemen. IRLARA will focus on further increasing the capacity and understanding of stakeholders directly involved in the project implementation according to a capacity gap assessment and action plan prepared by the Social Fund for Development; (b) Poor coordination and collaboration between agencies, especially at the local level, and between governorates and central agencies. Mitigation: establishing transparent and participatory implementation procedures; developing continuous and appropriate capacity building program for key stakeholders and regular monitoring missions by the SFD and MAI, with the participation of the World Bank and the IFC.

(G) INVESTMENT COSTING

26. The total cost of the proposed project is US$46 million. This is additional finance to the US$ 20 million under the existing Rainfed Agriculture and Livestock project (RALP). The Government of Yemen will provide some co-financing through in-kind contributions. The cost per component is estimated as follows:

COMPONENT	**COST (US million)**
COMPONENT 1: Climate resilient soil and water conservation investments	26 (57%)
COMPONENT 2: Improving livelihoods through productive rural investments	7 (15%)
COMPONENT 3: Integrated community risk management	8 (17%)
COMPONENT 4: Strategic Knowledge Management and Project Coordination	5 (11%)
TOTAL	**46**

(H) RESULTS AND PERFORMANCE FRAMEWORK

Component	Outputs	Outcomes	Indicators	Critical Conditions
Component 1: Climate resilient soil and water conservation investments	Increase in the investments in soil and water conservation through integrated watershed management approach that takes into account climate considerations	Innovative soil and water conservation practices improve agricultural productivity and reduce the impact of climate risks	Number of Comprehensive Watershed Management Plans	National institutions and local government actively participate in planning and training events
Component 2: Improving livelihoods through productive rural investments	Alternative income generation projects based on climate resilient agriculture are being implemented by community groups	Innovative investment channels improve the livelihoods of local populations and reduce the impact of climate risks	Number of community sub-projects initiated	Villagers actively participate in training events to acquire technical skills and build cohesion
Component 3: Integrated community risk management	A risk management scheme and social protection measures are in place for vulnerable households	The security of the most vulnerable groups is increased	% of households benefitting from the social protection measures Number of communities adopting community based early warning systems	Stakeholders at local and governorate levels understand the differentiated nature of vulnerability for different socio-economic groups
Component 4: Strategic Knowledge management and Project coordination	Efficient project coordination and knowledge management mechanisms are developed and utilized	Appropriate information concerning IRLARA activities is shared at national and international levels	Number of information sharing activities on project initiatives % of approved annual work plans implemented	Different national stakeholders have appropriate technical capacities

Annex A. Detailed Project Description

Component 1: Climate resilient soil and water conservation investments

1. Rainfall and soil water are fundamental parts of ecosystems which supply goods and services for human well-being; these services are especially important to the most vulnerable sectors of society. The availability of rain and soil water will consequently determine ecosystem productivity, both for agricultural and natural systems. This component aims to improve the climate resilience of the watershed based ecosystems in the rainfed areas of Yemen through (i) integrated soil and water conservation measures at the watershed/basin level, (ii) community mobilization and training to build local capacities to manage productive natural resources in an integrated and sustainable manner, and (iii) Piloting Payment for Environmental Services (PES). The expected outcome of this component is improved ecosystem stability and provision of services in the climate constrained future. Better protection and management of key habitats and natural resources will benefit poor, marginalized and indigenous communities by protecting ecosystem services and maintaining access to resources during difficult times, including drought and disasters.

2. Water harvesting has been the foundation of Yemeni agriculture and has been practiced since immemorial times, thus critically shaping local eco-systems and agro-ecosystems. Man-made terraces in particular are part of the Yemeni landscape: it is estimated that they account for 20-25% of all cultivated land. Terraces, combined with supplementary irrigation systems such as tanks, make crop cultivation possible in areas of erratic and low rainfall, and generally increase crop productivity through retaining soil moisture. It has been estimated that terraces receive up to 40 % more moisture than that from direct rainfall on the soil. In addition to retaining moisture, in mountainous areas, terracing is the main solution to controlling water erosion, one of the major causes of soil loss and soil degradation. Terracing builds up plots of fertile soil, years after years. Without terraces, most of Yemen highlands would be barren. Therefore, terraces are essential for both soil (and hence nutrient) and water conservation.

1.1. Scaling up soil and water conservation through integrated watershed management approach

3. Ecosystem services suffer when rain and soil water become scarce. This in turn affects human livelihoods. Given that current agricultural practices (timing of harvesting, sowing etc) are not able to address the increased climate variability or the extreme climate hazards means that the livelihoods of the rainfed farmers are becoming even more precarious. For poor subsistence farmers in the rainfed regions of Yemen, the only solution is to better harvest and conserve rain water and soil. Water harvesting takes several forms: (i) terraces, which retain soil and water; (ii) small check dams and retention structures; (iii) tanks and cisterns, (iv) upper catchment re-vegetation, (v) wadi protection etc. IRLARA will adopt an *Integrated Watershed Management* (IWM) approach, which provides a framework to integrate natural resource management with community livelihoods in a sustainable way by focusing on the sustainability of ecosystem services as well as sustainable benefits for human well-being. It addresses the interdependent components of farming systems and natural resources management within a watershed area in a holistic manner. IWM has a strong link to income-generating activities, ultimately leading to sustainable and improved livelihoods. It addresses issues of degradation of natural resources, soil erosion, landslides, floods, frequent droughts and desertification, low agricultural productivity, poor water quantity and quality, and insufficient protection of agricultural land.

4. The comprehensive IWM approach will focus on the watershed level, cutting across administrative districts, through formulation of a Comprehensive Watershed Management Plans

and implementation of inter-community and district level sub-projects. These plans combine hydrological information, land use plans, future climate scenarios, socio-economic indicators and information on the local governance, and state the common objectives formulated in coordination with local institutions (farmer groups, water user associations, local councils etc). From the climate resilience point of view it is crucial to focus on targeting the different drivers of vulnerability: exposure, adaptive capacity and sensitivity. Working with communities in diverse geographical location (from highlands to wadis) with diverse socio-economic indicators (level of poverty and education, market access) requires careful design of the intervention mechanisms which should be tailored to correspond to the vulnerability context of the village and its populations.

5. More specifically, at the community level this sub-component will rehabilitate and improve small spate systems, water harvesting and water and soil conservation structures on terraces in the upper watersheds, such as tanks and cisterns and rangeland re-vegetation. These investments will be low cost, use participatory contributions of the local communities, including locally familiar techniques, labour and material. They will significantly help in increasing groundwater recharge and mitigate soil loss from erosion, which in turn would enhance crop rooting depth, soil moisture retention capacity and improved yields from rainfed agriculture on the terraces. This sub-component will fill a number of the gaps and limitations in ongoing SWC projects and also scale up best practices and success stories. In particular, at community level, this component will widen its scope to include costly SWC activities and provide communities with crucial training and capacity building in integrated watershed management and planning. Under this sub-component is it crucial that the Water and Environment Unit of the Social Fund coordinates with other work programs under the SFD (such as Labor Intensive Work Program and Integrated Intervention Approach) to be able to target diverse set of communities under the watershed level.

1.2. Improve local water governance

6. Lack of reliable and sustainable water sources is one of the most significant problems facing rural Yemen. Future risks such as climate change and population growth, are expected to bring more uncertainty than it is already the case and put additional pressure on water resources. The lack of capacity of district councils, coupled with weak capacity and presence of NWRA at decentralized levels, stands in the way of improving local governance to manage inter-linked issues of climate risks, soil and water conservations, and targeting the most vulnerable. Also, the weak capacity of local councils to allocate and manage resources efficiently and to ensure that funds are invested in quality and well-monitored projects has long been recognized as one of the reasons for not fully implementing the Decentralization Law. IRLARA aims to work through existing decentralization structures in developing capacities of local councils and communities to manage water resources (including groundwater) and include climate resilience in local and community planning. Special focus will be given to building capacities and raising awareness for inter-community planning and action, as part of the investments for integrated watershed management, e.g. promoting coordination between communities covering upper and lower watershed management.

7. This sub-component will focus on improving local water governance through community mobilization and working with National Water Resource Authority (NWRA) and local councils on water management aspects. This activity is complementary to the *Climate and Risk Resiliency Measures* intervention under the PPCR program, aiming to support sector reform(s) to remove barriers that constrain ongoing water sector investments, through a Development Policy Grant (DPG). It will build on the experience of RALP and other SFD programs, such as the

Empowering Local Development, in working with Local Councils in promoting the project in the districts, and providing institutional support. In addition, IRLARA will work in coordination with Ministry of Local Administration (MLA) and NWRA to make sure that institutional coordination for local water management takes place across different levels of governance.

1.3. Piloting Payment for Environmental Services (PES)

8. It has been shown that well maintained terraces can generate both: (1) *Private benefits* for the farmer under the form of higher and more stable yields. These benefits are appropriated by the farmer as crops are being sold on the market or consumed by the family, justifying terrace maintenance if the extra return from maintaining the terrace is in excess of the cost of terrace maintenance. And more importantly, it also retains people on their land. (2) *Social benefits* under the form of water harvesting that feeds springs at the bottom of the watershed, delivers more regular water flows in the wadis, and recharges underground water aquifers for the downstream and coastal areas. These benefits are not captured by the farmer, leading to under-investment in terrace maintenance relative to the social optimum. As a consequence, some terraces are abandoned because the private benefit is below maintenance cost, even though their full return (private and social) is above maintenance cost. Lack of internalization of the social benefits of terrace maintenance by the farmer constitutes a market failure that contributes to terrace degradation.

9. Payments for environmental services (PES) are meant to compensate for this market failure. PES should not be interpreted as a subsidy scheme, but as payment for a service rendered by a provider, here a farmer, with economic value for the rest of society. The payment is to create an incentive to the provider of the service to deliver it at the socially optimal level.

10. IRLARA will pilot PES to encourage investments in terraces rehabilitation and other eco-system maintenance activities. This pilot needs careful design, including the establishment of exact services that the work provides, as well as the structure for transferring the payments:

a. Payment to a community fund (or to a sub-account of the larger fund we are creating under the DPG): The payment could be made to the representative body of the community where terraces are located. This is analogous to PES for avoided deforestation in Mexico, where payment is made to the ejido community. The community would thus the authority responsible to enforce maintenance by community members. The payment received by the community can be allocated to members, or used to finance public goods for the community such as a terrace rehabilitation service, local water projects, other infrastructure, or productive programs. We need to verify the legality of this transfer if there are individual titles over the land.
b. Contracting for maintenance of all terraces in the community: The PES contract for terrace maintenance will come after completion of a separate rehabilitation program if there has been one. The contract will be for maintenance of ALL terraces in the community, not just terraces that were rehabilitated. The meters of terrace in good standing are recorded in the contract. The payment is made once a year upon verification that the recorded meters of terrace are in good standing. Payment is negated if more than a margin of error has not been maintained. Verification is initially visual, based on a community plan of standing terraces. Subsequent verifications could be done through remote sensing instruments.

Component 2: Improving livelihoods through productive rural investments

11. Building on the existing initiatives by Social Fund for Development (SFD), IFAD, the World Bank, and IFC this component will aim to develop innovative and productive rural investment channels and opportunities for farmers and community-based organizations, with a special focus on women. This component will target both subsistence farmers as well as cash crop farmers, by promoting economic diversification and income generating activities e.g. on animal production, honey and coffee, building on the RALP experience. The underlying rational is that the communities need to diversify their income base from agriculture – crops and livestock – as a critical part of increased climate resilience.

2.1. Small-scale income generation activities

12. Under this component IRLARA will scale-up existing RALP initiatives for providing seed money and technical assistance for small income generation activities (handicrafts, beekeeping, etc). Additionally, IRLARA will build on the experience of the Agrobiodiversity and Climate Adaptation project (ACAP), to offer communities a practical way of alleviating poverty through the sustainable use and conservation of agro-biodiversity resources by financing small, sustainable projects run by farmers in the targeted rainfed areas. For instance, native species (that have both ecological and economic importance) that have been lost could be re-introduced to re-populate local areas and yield a diversified portfolio of income streams to enhance resilience of local communities against climatic and other shocks. Additionally, they will be encouraged to test new practices that will increase the productivity of crops and improve water usage. The kinds of projects that would be financed include:

a) Construction of small nurseries/home-gardens with a preference for those using grey water and other conservation methods. These would produce plants, vegetables, fruits, aromatic and medicinal plants;
b) planting, preparation, and packaging of medicinal herbs (aromatic and spices);
c) small home-based catering business specializing in traditional recipes;
d) agro-processing;
e) beekeeping;
f) planting of almond trees; and
g) producing traditional ceramic ware for conservation purposes (to house seeds, etc.).

2.2. Promoting the role livestock production for Climate Change adaptation

13. In Yemen livestock presents relatively larger share of the livelihoods of rural poor given that they are likely to live in marginal crop production areas or closer to rangelands. Given that animal production is 14 times more powerful at reducing poverty than qat and horticulture production[72], the role of livestock in securing the livelihoods of rural poor is unquestionable. Livestock is particularly important for increasing the resilience of vulnerable poor people, subject to climatic, market and disease shocks through diversifying risk and increasing assets. At the same time, climate change has major negative impact on livestock production through vector-borne diseases. Increasing temperatures have supported the expansion of vector populations into cooler areas, either into higher altitude systems (for example, malaria and livestock tick-borne diseases) or into more temperate zones.

14. As part of the multi-focal approach to climate resilience at local level, IRLARA will support livestock activities for improving adaptive capacity of local populations. This is complementary to integrated watershed management under component 1 (rangeland management

[72] Coping Strategies in Rural Yemen (World Bank, 2010)

improves upper catchment vegetation and livestock productivity) and risk mitigation activities under component 3 (the role of livestock in securing local livelihoods in the face of climate hazards).

15. Given the important role of women in livestock management in Yemen, this sub-component has special focus on improving adaptive capacity of the women and building on their indigenous knowledge. 1994 IFAD study in Yemen identified indigenous knowledge about the characteristics and requirements of each breed and the adaptation of each breed to its environment: (i) women differentiate between breeding flock and fattening flock, and among different husbandry policies (e.g. continuous versus occasional breeding), (ii) they have extensive indigenous knowledge of the nutritional requirements of their animals and the effect of feed intake on animal growth rates, and (iii) also possess indigenous veterinary knowledge. This sub-component will build on RALP's experience in working with women and rural producer groups for improving their livestock activities through rangeland management and community animal health workers.

2.3 Promoting lucrative value chains to create more local value added

16. This sub-component focuses on the longer term efforts for building climate resilience by expanding income generating activities in order to enhance food security and eco-system conservation. By providing alternative sources of income through improved market access and focusing on products with lucrative value chain, such as coffee and honey, the project aims to improve the adaptive capacity of farmers through vertical expansion of their livelihood options. A study carried out by Small Micro Enterprise Promotions Services (SMEPS) and The Royal Tropical Institute (KIT) (2009), found that though few households are involved in honey-bee raising and coffee production, there are opportunities for improving farmers income from coffee and honey production, as well as bringing additional households into honey-bee raising, a very lucrative economic sub-sector. Coffee production is a smallholder activity and honey production does not require land access, though cash and social networks are required to move honey-beehives to feeding areas according to the different flower seasons.

17. This sub-component builds directly on the experience of the RALP and IFC by supporting producers in building value chain for valuable products, such as honey, coffee, and livestock. These sub-sectors also bring employment in the rural areas through the various backward and forward linkages (such as tree planting) they command. Hence investments in these sub-sectors are likely to increase economic opportunities in rural areas and improve the livelihood not only for the producers themselves, but for all the actors in the value chain.

Component 3: Integrated community risk management

18. Rural communities in Yemen are faced with several risks and a holistic approach is needed to address their vulnerabilities. The project will adopt a comprehensive approach to improving resilience, combining initiatives in disaster risk management, climate change adaptation and social protection. This component will explore opportunities for piloting innovative activities on social protection and 'risk pooling of agricultural and livestock production', such as traditional solidarity mechanisms, as well as institutional capacity building for establishing an *early warning system* in support of climate resilience related initiatives. The main expected outcome is improved adaptive capacity among poor and vulnerable groups and reduced social vulnerability among the communities, through targeted interventions that strengthen the interaction between economic growth and social inclusion.

19. This component will be prepared in coordination with RALP and other relevant units/programs of the Social Fund, such as Labor Intensive Work Program and micro-finance unit. The idea is to broaden the scope of available "instruments" currently in use in the RALP, to include *protective measures,* such as *cash for work* to implement community sub-projects on integrated watershed management with the RALP philosophy. This helps to target the most vulnerable groups and communities' living in chronic crisis situation and climate hazard prone locations. In addition, the objective is to revitalize some of the traditional risk mitigation measures and incorporate them into the early warning system as part of community development plans. This type of programs, once established can operate as productive safety net program that can be scaled up to respond to shocks of various kinds, such as crop failures or other natural disasters.

3.1 Innovative measures to protect the poor and most vulnerable

20. This sub-component will complement the integrated ecosystem management approach by building and ensuring better linkages between social dimension of climate change and soil and water conservation. This will be through implementation of a 'social safety nets' for households and household groups, in order to rehabilitate their livelihoods and revive their productive assets. Social protection activities, such as cash for work and cash transfers, provide income and consumption transfers to poor and vulnerable households, protect their livelihoods, and enhance their social status and rights.

21. ***Labor-Intensive Work Program.*** A good example of such an approach is the Labor-Intensive Work program, piloted with success by the Social Fund for Development under the Global Food Crisis Response Program. The Program has demonstrated that not only did it respond to emergency needs through quick disbursement, but it also contributed to a long-term future economic development. It has also encouraged women's participation and designed some work for them, consistent with their physical ability and culture of the community. Given the very low participation of rural women in the paid labor force, such programs present considerable added value for the rural households. In addition, some types of the works (e.g., road paving) have an opportunity to be combined with the development of skills for future job opportunities.

22. Under this sub-component special attention will be given to revitalizing traditional mechanisms of solidarity and mutual assistance in order to support people in need or during important events and in a case of a natural hazard. This activity will be done through capacity building and awareness raising by community facilitators.

3.2 Preventing and managing catastrophic risk at community level

23. Under this sub-component IRLARA will work in coordination with the Disaster Risk Management team, communities, local councils and relevant national level stakeholders in demonstrating by pilots how to take the first step in moving from reactive to preventive approaches to disaster management. These pilots will focus on developing community based early warning systems (CBEWS) and adapting them into community development plans. CBEWS is "people-centered" system and empowers individuals and communities threatened by hazards to act in sufficient time and in an appropriate manner so as to reduce the possibility of personal injury, loss of life, damage to property, environment and loss of livelihood. It provides the community and disaster risk management (DRM) workers with advance information on the risks (floods, landslides, debris flow, etc) that can be readily translated to disaster prevention, preparedness (DPP) response actions against loss of lives and injuries. CBEWS also helps reduce economic losses by allowing people to better protect their assets and livelihood.

24. Currently SFD has limited capacity in designing and implementing pilots on disaster risk management. Thus, the first step will be in developing "in-house" capacity and improve the awareness of the inter-linkages between climate change adaptation, social protection and disaster risk management. A consultant (national/international) would be hired to work with RALP/SFD team to work with different teams and to analyze where DRM aspects could be included.

Component 4: Strategic Knowledge management and Project coordination

4.1. Knowledge management and incorporating valuable local indigenous knowledge into climate policies and strategies

25. The project will support development of knowledge and learning products to be shared with major ministerial agencies, technical and financial partners and national and international NGOs. More specifically, this sub-component includes collecting and documenting local best experiences and practices, as well as indigenous knowledge on activities improving climate resilience at local level, their dissemination in coordination with relevant local and national stakeholders as well as promoting to incorporate them into national and sub-national policies and strategies. This knowledge management component will be carried out in coordination with PPCR coordination unit at EPA. IRLARA will also coordinate with the Ministry of Agriculture and Irrigation (MAI) to incorporate the lessons learned into the proposed National Irrigation Program (NIP).

4.2 Project Coordination

26. The Agriculture and Rural Development Unit of the Social Fund for Development will be in charge for project implementation and coordination with other SFD units as well as with other institutions responsible for implementing the SPCR.

Climate-Resilient Integrated Coastal Zone Management Project

(CR-ICZM)

Concept Note

INVESTMENT IV

I. BACKGROUND

1. The 2,200 km coastline of Yemen is a source for a wide range of services, from supply of freshwater, food, timber, minerals and fuels, habitats, water cycling, soil formation and retention, erosion regulation and natural hazard regulation to cultural heritage, spiritual and religious values and recreation and aesthetic values. Yemen's coastal areas and the services provided by its rich ecosystems are a natural hub for economic and social development in terms of employment and income for the coastal rural poor, coastal settlements, coastal infrastructure, including roads and port facilities, fisheries, tourism and new development initiatives. The past years have seen a steady movement of people from the agricultural hinterland toward the coastal areas, resulting in an estimated population living in the immediate coastal areas of 3.5-4 million. Annual growth rates of the coastal population are expected to exceed the mean national level of 3 percent due to continued migration from the hinterland. Continued population growth at the current rate is likely to exceed the coastal carrying capacity, given the high reliance on natural resource exploitation for livelihoods and food security, especially of the rural poor. Uncoordinated development puts additional pressure on coastal resources, resulting in overexploitation, contamination, degradation and physical alteration of economically important habitats.

2. In November 2009 a National ICZM Decree was approved by Cabinet, providing a framework for cross-sector coordination and incorporation of climate resilience into development planning and to address key economic sectors. Integrated Coastal Zone Management (ICZM) entails progressive prioritization and harmonized planning by the various administrative levels, requiring the ability to cross institutional and sectoral boundaries. The National Decree has seen little implementation to-date, with impediments to effective ICZM being incoherent objectives and strategies of different sectors and departments, absence of law enforcement, overlapping mandates of government agencies at central and local levels, and a ubiquitous lack of provincial and local management capacity concerning critical coastal management elements and tasks. In a time when the major policy drivers for decision making for the coast are based on short-term expectations and targets, CZM capacity at the institutional and personal levels is crucial. However, physical (infrastructure, staffing and funding) and human (personal skills) capacities are weaker at the local level, with agencies involved in local governance being the weakest, and agencies which are charged with "soft tasks" such as local governance, environment and tourism are weaker than agencies managing sectors which are directly economically relevant, or which concern extraction of valuable resources. The National ICZM Decree provides an opportunity to demonstrate ICZM as an important poverty reduction and environmental protection mechanism for potential scaling-up.

3. Recent appraisals of climate risks to Yemen's social and environmental systems suggest serious threats. Priority areas of adaptation and mitigation action have been identified in Yemen's 2001 Initial National Communication (INC) to the Conference of Parties under the United Nations Framework Convention on Climate Change (UNFCCC) and the National Adaptation Programme of Action (NAPA), which was endorsed by Cabinet Decree in March 2009. The following key environmental consequences for Yemen's coastal systems suggest a significant adverse impact on coastal communities, economy and infrastructure:

- Decreased freshwater availability and quality, droughts and desertification
- Increase in frequency and severity of extreme weather events, storms and flash floods
- Increased erosion and soil degradation
- Decline in arable land and productivity in agro-systems and pasture

- Increased mobilization of sediments, dust and pollutants and coastal re-deposition and concentration
- Changed/reduced ocean primary productivity
- Deterioration of habitats and ecosystems, such as islands, coral reefs, mangroves and wetlands
- Uncertainty in fisheries resources/productivity
- Disease outbreaks (either water borne or vector borne)

4. Of the 22 adaptation options identified by the NAPA 15 are of relevance for coastal zone management, including the development and implementation of ICZM programs. An integrated framework for coastal planning and management is necessary to address all key aspects of coastal development, including incorporating climate change adaptation into economic development policies, overlaying existing zoning with climate resilience aspects to coastal areas, and maintaining ecosystem services as a key feature of climate-resilient development. An institutional framework informed and supported by climate change adaptation knowledge/information will ensure that coastal resources are managed in a holistic and sustainable manner. The project will seek to address the impacts of climate change on coastal ecosystems and communities through a set of urgent measures in three target sites, which can later be replicated and scaled up to the other six coastal governorates.

II. DEVELOPMENT AND SPECIFIC OBJECTIVES

5. The project will focus on three coastal governorates: Shabwa, Hodeidah and Aden in a two-fold manner: i) creating a long-lasting enabling environment for climate-resilient decision making by the governorates; and ii) demonstrating climate adaptation measures in select sites within their boundaries, namely Bir Ali (Shabwa governorate), Kamaran-Luhaiyah (Hodeidah governorate) and the coast of Aden (Aden governorate) for future replication and up-scale.

6. These governorates and sites were purposely selected for the following reasons:

- Both Hodeidah and Aden governorates are used as case studies for coastal zone management, long-term climate risks and adaptation in the coastal zone sector in Yemen's Initial and Second (currently in draft form) National Communication to the Convention respectively, suggesting high national priorities for intervention.
- The potential high impact of climate change on the three sites; for example, Aden has been cited as one of top 20 cities in the world vulnerable to sea level rise; Hodeidah has also been identified as a high impact area from sea level rise. The sites have different attributes in terms of natural resource assets, development status and land uses, allowing the demonstration of different adaptation measures.
- The availability of localized coastal conservation and development management schemes for the three sites as a result of previous projects, which can be used as baseline for climate-resilient interventions.
- These sites have been the focus of an institution-centered Strategic Environmental Assessment (SEA), funded by the Bank Netherlands Partnership Program (BNPP), which provides an analysis of their management gaps and suggests points of intervention, some of which the project will seek to implement.

7. The Project Development Objective is to a) enhance capacity and awareness of institutions and stakeholders on climate-resilient ICZM, at national and local levels in selected

coastal governorates; and b) demonstrate benefits of implementing climate-resilient ICZM in three target sites.

8. Specific project outcomes are:

(i) Strengthened institutional capacity for climate-resilient ICZM decision making at Shabwa, Hodeidah and Aden governorates
(ii) Increased awareness of institutions and stakeholders to ICZM and climate change
(iii) Increased capacity of local practitioners to generate localized, downscaled climate change models, and established linkages with the future National Climate Information System, leading to informed decision making and development planning for the coast
(iv) Demonstration of climate adaptation measures at the three target sites

III. KEY INDICATORS AND BASELINE

9. The following indicators will be used to evaluate project progress toward achieving the development objective:

(i) Decisions related to coastal development proactively integrate are made by existing decision makers at the governorate level and include climate-resilient considerations (baseline: decisions are made without regard to future climatic scenarios)
(ii) Practitioners in project governorates are able to generate and use localized downscaled climate change models (baseline: inadequate local capacity for the generation of localized climate modeling)
(iii) Diversified income sources, mechanisms for improved ecosystem services and climate-resilient infrastructure are demonstrated at select target sites (baseline: limited fishing practices and tourism, lack of adequate management of mangroves and other ecosystem services and insufficient infrastructure to prevent adverse impact of sea level rise and extreme weather events)

IV. ANTICIPATED COMPONENTS AND ACTIVITIES

10. The proposed project will consist of four inter-related components, which will be implemented within a time frame of five years (2012-2016). Please see Annex A: Detailed Project Description.

Component 1: Institutionalization and Capacity Building for Climate-Resilient ICZM (US$5.88).

11. This component will focus on strengthening the national and local institutional frameworks' capacity to integrate for climate-resilient ICZM into decision making, implementation and enforcement in Shabwa, Hodeidah and Aden governorates in the context of the implementation of the National ICZM Decree and NAPA by champion governors, and building the capacity of stakeholders at national and local levels. This will be done through targeted capacity building, overlaying of existing sites' management plans, zoning and construction codes with climate resilience aspects, and analysis and prioritization of adaptation measures for Yemen in general and the project sites in specific. This component will also finance the preparation and implementation of a communication and awareness program on ICZM, climate change and project results, targeting audiences at national and local levels.

Component 2: Knowledge Management and Climate Change Modeling.

12. This component aims to bridge the institutional, knowledge and capacity gap related to coastal climate change modeling by identifying a suitable entity to collect, update and utilize coastal climate records, building its physical (equipment and software) and human (staffing and skills) capacities and identifying independent sources of funding for its functioning and maintenance after the project is completed. This component will also focus on establishing and maintaining the necessary institutional linkages with relevant agencies, research centers and programs such that relevant data and information are available for development planning and decision/policy making processes. The component will result in climate change modeling specific for Yemen's coast, thus adding a coastal dimension to the proposed National Climate Information System funded by the PPCR's Enhancing Climate and Risk Management Capabilities TA. A Memorandum of Understanding will be signed with an international climate institute specializing in this region to mentor and closely collaborate with the PMU during the planning and implementation of this component.

Component 3: Demonstration of Climate-resilient ICZM.

13. The project will demonstrate optimum adaptive development practices within the ICZM and NAPA frameworks, covering diversified income sources, climate-resilient infrastructure and improved ecosystem services to improve social safety nets by increasing climate resilience at the three target sites. This component will promote strong participation of coastal communities (e.g., through women societies and fishers' cooperatives) in the implementation of some prioritized on-the-ground activities identified by the strategic analysis under Component 1. Private small and medium enterprises from the fisheries sector will be engaged in implementation with close collaboration with the ongoing Fisheries Resource Management and Conservation project. . The recently formed Fisheries Authorities in Shabwa, Aden and Hodeidah are also expected to be strongly involved in implementation.

Component 4: Project Management and M&E.

14. The project will be implemented by the Environment Protection Authority (EPA) under the Ministry of Water and Environment (MWE) in Sana'a through a Project Management Unit (PMU). The PMU will comprise of a Project Director, an M&E Officer, a Communication and Social Accountability Officer, a Procurement Officer and a Financial Management Officer. The procurement and financial management officers of the PPCR Coordination Management Unit (CMU) will also support the CR-ICZM project. The PMU will be technically supported by an international technical specialist who will be hired to build the PMU's technical capacity by providing technical input to work planning, terms of reference, review of consultants' deliverables and the day-to-day management of the project. The specialist will also play an important part in rolling out the project's implementation arrangements.

Summary of Project Design and Flow of Results

Project Development Objectives	
a) enhance capacity and awareness of institutions and stakeholders on climate-resilient ICZM, at national and local levels in selected coastal governorates	b) to demonstrate benefits of implementing climate-resilient ICZM in three target sites
Component **1**: Institutionalization and capacity building for climate-resilient ICZM	Component **3**: Demonstration of climate-resilient ICZM

Component **2**: Climate change modeling	
↑ Component **4**: Project management and M&E ↑	

V. INSTITUTIONAL ARRANGEMENTS

15. At the national level, project implementation will be overseen by the Sana'a-based EPA, through a PMU. The EPA Chairman will meet quarterly with the PMU to discuss progress and ensure that fiduciary requirements are complied with. The project national Steering Committee chaired by MOPIC and comprising relevant central-level line ministries and agencies as well as the four governors and representatives from the private sector and civil society, will meet on a semi-annual basis to provide strategic guidance to the project and make the link between the lessons and results of the project and the national process. At the local level, the PMU will be supported by two Field Units (FUs): a North Red Sea FU covering the Hodeidah governorate, and a SouthGulf of Aden FU covering Shabwa and Aden governorates. The FUs will provide technical support to the governorates for all field-based activities. Cross-sectoral coordination at the national level will be ensured through the national Steering Committee.

16. EPA has weak project management and fiduciary capacity, which puts project management at risk. This risk will be mitigated through the enhancement of EPA's capacity at the central and local levels according to a capacity action plan produced under component 1 of the project. In addition, due to the inter-sectoral nature of the project, implementation and decision making will be made by a wide range of stakeholders at national and local levels and will not be the responsibility of EPA alone.

17. The private sector will be involved in the decision-making process through its representation in the Steering Committee, and in the implementation of on-the-ground adaptation measures under component 3 through small and medium enterprises. Please see Detailed Project Implementation Arrangements on page 121.

VI. RISKS

18. Key envisioned risks to the achievement of the project objective are the following:

(iii) Political instability and security risks: Lack of security and political stability in the country and the coastal region in specific, affecting the entire Yemen portfolio. *Mitigation:* Implementation of activities is expected to take place at different levels in order to minimize reliance on central government.

(iv) Institutional risks: (a) Limited understanding of ICZM and climate change by Yemeni decision- makers and other stakeholders at various levels. *Mitigation:* The project will increase the capacity and understanding of stakeholders according to a capacity gap assessment and action plan. A communication and awareness program will be designed and implemented, aiming to explain ICZM and climate change, and sensitize stakeholders about project activities and progress; (b) Poor coordination and collaboration between agencies at the local level, and between governorates and central agencies. *Mitigation:* Intra-coastal governorate coordination will be enhanced through the Steering Committee; and (c) The EPA offices at the national and local levels have weak capacity and lack experience in implementing Bank projects. *Mitigation:* The EPA will retain qualified consultants in project management, technical expertise and fiduciary areas. These consultants will play a significant role in implementing the project and building the capacity of EPA's own staff.

VII. INVESTMENT COSTING

19. The project will be financed by the by the Least Developed Countries Fund under the supervision of the Global Environment Facility (GEF) Secretariat through a US$4.5 million grant, and co-financed by the PPCR through the Strategic Climate Fund (SCF) through a US$20 million grant. Parallel co-financing will be provided by the Yemen Liquefied Natural Gas (YLNG) for US$1 million (TBC), through direct agreement with GoY. The Government of Yemen will provide some co-financing through in-kind contributions. The cost per component is estimated as follows:

COMPONENT	**COST** (US$ million)	
	PPCR	**LDCF**
1. Institutionalization and Capacity Building for Climate-Resilient ICZM	5.88	1.14
2. Knowledge Management and Climate Change Modeling	3.14	0.71
3. Demonstration of Climate-resilient ICZM	8.94	2.18
4. Project Management and M&E	1.04	0.24
Contingencies (5%)	1.0	0.23
Total	20	4.5

VIII. RESULTS AND PERFORMANCE FRAMEWORK

General Objective	Outputs	Outcomes	Critical conditions
a) enhance capacity and awareness of institutions and stakeholders on climate-resilient ICZM, at national and local levels in selected coastal governorates; and b) demonstrate benefits of implementing climate-resilient ICZM in three target sites	Training, awareness raising and local governance harmonization for climate-resilient ICZM	Strengthened institutional capacity to integrate climate-resilient ICZM into decision making at Shabwa, Hodeidah and Aden governorates Increased awareness to ICZM and climate change Increased capacity of local practitioners to generate localized, downscaled climate change models, and established linkages with the future National Climate Information System, leading to informed decision making and development planning for the coast Demonstration of climate adaptation measures at the three target sites	Security and political stability in the country Government continues its engagement with national priority programs Government commitment to implement the NAPA and National ICZM Decree

Component	Outputs	Outcomes	Indicators	Critical Conditions
Component 1: Institutionalization and Capacity Building for Climate-Resilient ICZM	Development of capacities of governorates to integrate climate-resilient ICZM into decision making at the three	Strengthened institutional capacity to integrate climate-resilient ICZM into decision making at Shabwa, Hodeidah and	% of actions implemented as identified by the institutional framework action plan for each governorate	Stakeholders are willing to participate in decisions concerning zoning and management plans

Component	Outputs	Outcomes	Indicators	Critical Conditions
	governorates	Aden governorates		
			Availability of zoning, management plans and construction codes for the three sites, integrating climate adaptation considerations	Full implementation of the project's communication and awareness program
			Availability of a prioritized menu of best-practice options of alternative income sources, mechanisms for improved ecosystem services and climate-resilient infrastructure for the three target sites	
			% of communication and awareness raising program implemented	
	Dissemination of ICZM and climate adaptation knowledge as well as lessons learned from project implementation to local and national stakeholders	Increased awareness to ICZM and climate change.		
Component 2: Knowledge Management and Climate Change Modeling	Training of local practitioners on climate modeling	Increased capacity of local practitioners to generate localized, downscaled climate change models,	Number of practitioners trained to undertake climate modeling	Identification of appropriate host, institutional linkages and independent funding

Component	Outputs	Outcomes	Indicators	Critical Conditions
		and established institutional linkages, including with the future National Climate Information System, leading to informed decision making and development planning for the coast.		
Component 3: Demonstration of Climate-resilient ICZM	Implementation of adaptation measures at the three target sites according to a prioritized list	Demonstration of climate adaptation measures at the three target sites	Percent of identified alternative income sources implemented Percent of identified ecosystem services implemented Percent of identified climate-resilient infrastructure implemented	High standard implementation of agreed measures
Component 4: Project Management and M&E	Efficient and effective project management and M&E	Efficient and effective project management and M&E in accordance with the Grant Agreement, Project Implementation Manual, and annual work plans, and in compliance with fiduciary requirements	An effective M&E system is in place % of approved annual work plans implemented	Selection of qualified and experienced staff

Annex A: Detailed Project Description

Component 1: Institutionalization and Capacity Building for Climate-Resilient ICZM

Sub-component 1.1: Capacity building for climate-resilient ICZM

1. This sub-component will fund a capacity gap analysis for climate-resilient ICZM, focusing on key management elements and tasks as identified by the Strategic Environmental Assessment of Coastal Zone Management in Yemen.[73].

2. The gap analysis will focus primarily on stakeholders at the three participating governorates; however, other relevant national and local audience will also be included. A budgeted action plan will be proposed for capacity building, targeting primarily existing decision makers for coastal development in each governorate. Accordingly, workshops and training programs will be funded targeting national and local stakeholders as identified by the gap analysis.

Sub component 1.2: Integrating existing plans and codes with climate resilience elements

3. Existing zoning, management schemes and construction codes available for the pilot sites Bir Ali (in Shabwa), Kamaran-Luhaiyah (in Hodeida) and coast of Aden will be examined with the aim to identify gaps and opportunities for integration with appropriate climate-resilient ICZM elements. The enhanced additional proposed climate-resilience elements will then be submitted for approval by the relevant Governorate. Once approved, they will be submitted for Cabinet Resolution followed by legal promulgation by a Prime Minister Decree.

4. This output will be the result of a highly participatory process coordinated by the Communication and Social Accountability Officer with the support of the international technical specialist, informed by existing zoning work and management schemes previously performed for the sites, by the National ICZM Decree and the adaptation options proposed by the NAPA. The integrated management plans will include appropriate governorate planning, sector coordination, community/private awareness of climate change and ICZM and adaptation measures with a people-centered approach and special attention to traditional and new knowledge and practices.

Sub component 1.3: Analysis and prioritization of adaptation options for target sites

5. This sub-component will fund a strategic analysis for each spatial area looking at initiatives in Yemen and other countries/projects (such as the BNPP TA[74], FRMCP, the Netherlands Climate Assistance Programme and the UNDP/GOY-funded Economic Diversification Support Programme which has recently been launched) as well as the NAPA, and offering a menu of best-practice/win-win options of alternative livelihood schemes, mechanisms for improved ecosystem services and climate-resilient infrastructure. Of this compendium of options, low-hanging fruits will be identified and prioritized for implementation under Component 3 of the project.

6. The project will undertake a pre-feasibility study on desalination plants that could be implemented in the future by the government to bridge the water shortage in the country. The study will focus on promotion of sound environmental management approaches including compliance with the principles of ICZM and climate resilience for coastal infrastructure. The study will draw upon the ongoing World Bank-funded MNA Regional Water Outlook study.

[73] Study undertaken by GOPA consultants and funded by BNPP Grant; Final report dated August 2009

[74] Adaptation to the Impacts of Climate Change on Coastal Communities in the Southern Red Sea and Gulf Of Aden BNPP Grant

Sub component 1.4: Communication and awareness-raising

7. This sub-component will fund the development and implementation of a communication and awareness raising program on climate change, ICZM and project progress. Target audiences at national and local levels will be identified and communication and awareness raising tools will be devised and implemented accordingly. This program will also cover transparency and accountability measures as a key ICZM principle and a perception management tool especially concerning harmonization of zoning of sites and implementation of adaptation measures. The Communication and Social Accountability Officer within the PMU will be responsible for leading this sub-component, with the technical assistance of the international technical specialist.

Component 2: Knowledge Management and Climate Change Modeling

Sub-component 2.1: Capacity building for climate change modeling

8. This sub-component will fund a gap analysis focusing on users, data types and sources, methods of data collection, staffing and skills, equipment and software and institutional linkages necessary for climate change modeling of the Yemeni coast. The analysis will propose a permanent hub[75] for coastal climate modeling, as well as independent funding sources for the operation, maintenance and update of databases, equipment and skills beyond the life of the project. A budgeted plan of action addressing the identified gaps will be proposed and implemented. Due to the strong local focus of this component and its role in influencing decision making at local and national levels, stakeholders' engagement will be secured through periodical briefing to the Steering Committee.

Sub-component 2.2: Coastal climate change modeling

9. This sub- component will fund the implementation of refined downscaling and high-resolution simulations of climate change at the coastal area level, as well as coupled ocean-climate models, bioclimatic impact models and vulnerability assessments. The potential effects of climate change on biological productivity will receive special attention through oceanographic research. The climate change modeling generated under this sub-component is expected to add a coastal dimension to the proposed National Climate Information System funded by the PPCR's Enhancing Climate and Risk Management Capabilities TA.

Component 3: Demonstration of Climate-resilient ICZM

Sub component 3.1: Demonstration of diversified income sources

Diversification of income sources is likely to be demonstrated at the Bir Ali and Aden sites. Items funded under this sub-component could include small-scale value added products such as hat (kufia) stitching, beads weaving and shells embroidery; small scale fishmeal plants, fish mincing, fish smoking and dried cuttlefish products; seaweed cultivation, introduction of salt-tolerant crops using seawater irrigation, and small scale aquaculture. This sub-component can also fund the protection and preservation of existing touristic assets and development of new eco-tourism and recreational activities. The BNPP TA, UNDP/GOY-funded Economic Diversification Support Programme and the FRMCP will be used as three sources for income options in the fisheries and tourism sectors.

Sub component 3.2: Demonstration of improved ecosystem services

10. Improved ecosystem services are likely to be demonstrated at the Kamaran-Luhayah site. Items funded under this sub-component could include expanding green-belts and buffer zones by

[75] The Aden-based Fisheries Authorities (formerly the National Marine Research Center) may be proposed as the permanent hub for coastal climate data and modeling.

planting and replanting mangroves and palms; establishing and maintaining nurseries that provide cultivars and other materials, decreasing impacts from floods/drought through rain water retention, wetland conservation, climate-resilient environment friendly aquaculture and soft protection (e.g., beach nourishment and wetland construction and restoration).

Sub component 3.3: Demonstration of climate-resilient infrastructure

11. Climate resilient infrastructure is likely to be demonstrated at all three sites. Funded infrastructure could include stone walls to protect from storm surges, coastal defense and walls for areas vulnerable to erosion, etc.

Component 4: Project Management and M&E

12. Project implementation is the responsibility of the EPA through the PMU comprising a Project Director, an M&E Officer, a Communication and Social Accountability Officer, a Procurement Officer and a Financial Management officer. An international technical consultant specializing in ICZM and climate adaptation will be hired by EPA to support the PMU during the first years of project implementation. The specialist will be based at the PMU office in Aden, and will be responsible for: (i) enhancing the capacity of EPA staff in Aden and Hodeidah and the FUs' staff as needed, (ii) kick-starting the project's implementation arrangements (especially the Field Units and the Steering Committee); and (iii) providing daily technical input and support for project planning and implementation, including work plans, training plans, terms of reference, progress reports, bidding documents, safeguard policy implementation, review of consultant' outputs and the communication and awareness program. The PMU will be based in Sana'a and share the procurement and financial management officers with the CMU of the PPCR office also in Sana'a.

13. The PMU will be responsible for day-to-day management of project activities, M&E, implementation of the communication and awareness program, procurement and financial management. On-the-ground activities will be managed and supported by two Field Units (FUs) located in a north Red Sea and south Gulf of Aden coastal EPA branch respectively in Hodeidah and Aden (TBC) (covering Aden and Shabwa). The PMU will receive strategic guidance from the project's Steering Committee.

14. An M&E system will be put in place, which follows the requirements of the LDCF Results-Based Management Framework (RBM), including the use of the Adaptation Assessment Tracking Tool (AAT) for tracking of results and evaluation of progress. The system will track PMU performance in relation to: (i) progress in implementing scheduled activities and achieving project outcomes and objectives as measured by the project indicators; (ii) expenditures against budget allocations; and (iii) implementation of safeguard instruments. Information about progress at the three sites will be gathered by the Field Units. Project progress will be reported to the EPA, and communicated to the Steering Committee and the World Bank. The PMU will also report to the PPCR PCU on certain relevant key indicators.

Detailed Project Implementation Arrangements

1. The primary responsibility for managing the Climate-Resilient ICZM Project will lie with the Environment Protection Authority (EPA), an agency that operates under the oversight of the Ministry of Water and Environment. The EPA's general roles are the integration of environmental policy into national development policy, regulatory oversight and coordination of environmental activities among the relevant governmental and non-governmental entities. EPA has also been the primary government agency responsible for preparing the Initial National Communication to the UNFCCC and the NAPA. EPA has local branches in Hadramaut, Shabwa, Aden, Lahij, Ta'iz, Hodiedah and Hajah governorates, and another branch is presently being established in Abyan.

2. As the implementing agency of the project, EPA will oversee its implementation, and ensure that the directions chosen, actions undertaken and results achieved are in accordance with project documents and agreements. Through a Project Management Unit (PMU) based in Sana'a, the EPA will be responsible for the daily management of project activities, for monitoring and evaluating progress, reporting to the Ministry of Water and Environment, for overseeing the implementation of safeguard instruments, and for spearheading the preparation and implementation of the communication and awareness program. The PMU will comprise a Project Director, an M&E Officer, a Communication and Social Accountability Officer, a Procurement Officer and a Financial Management officer. The EPA Chairman in Sana'a will meet quarterly with the PMU to oversee project implementation, approve annual audits and ensure that the PMU establishes and maintains a filing system to record all documentation related to project implementation.

3. An international technical consultant specializing in ICZM and climate adaptation will be hired by EPA to support the PMU during the first years of project implementation. The specialist will be based at the PMU office in Aden, and will be responsible for: (i) enhancing the capacity of EPA staff in Aden, and Hodeidah and the FUs' staff as needed; (ii) kick-starting the project's implementation arrangements (especially the FUs and the Steering Committee); and (iii) providing daily technical input and support for project planning and implementation, including work plans, training plans, terms of reference, progress reports, bidding documents, safeguard policy implementation, review of consultant' outputs and the communication and awareness program.

4. Two Field Units will be established in the EPA offices in Aden (TBC) and Hodeidah respectively, each responsible for providing technical support, coordinating implementation and monitoring the progress of governorate-level activities, including the demonstration of adaptation measures at Bir Ali and coast of Aden (Aden FU) and Kamaran-Luhaiyah (Hodeidah FU) and the implementation of local communication and awareness activities. The EPA office in Aden has been tentatively selected to host the FU for Aden and Shabwa governorates. Each FU will comprise a coordinator, part time M&E staff and support staff. Communication between the Sana'a based PMU and the FUs will be facilitated through internet as feasible, phone conversations and monthly face to face meetings to ensure that activities are implemented according to the agreed work plans, to collect progress information for M&E purposes and to communicate challenges and risks which may require the intervention of EPA, MWE or the Steering Committee.

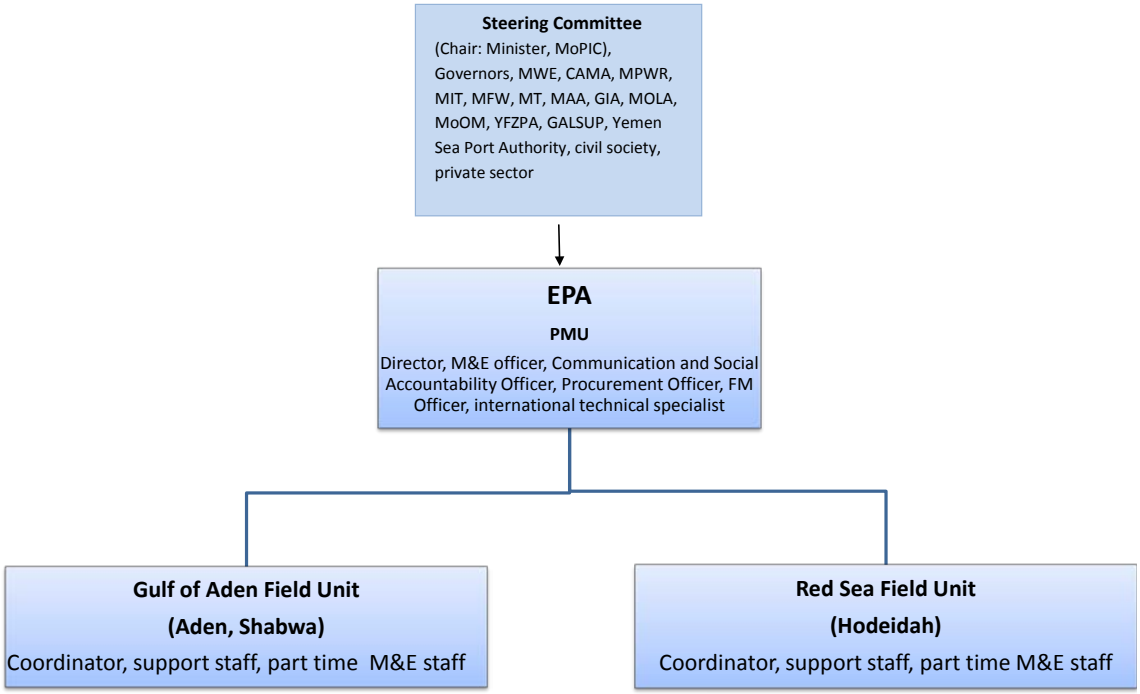
5. A national Steering Committee (SC) will be established to provide strategic guidance and ensure central-level endorsement and collaboration with the project. The SC will be chaired by MOPIC, and comprise representatives from relevant line ministries and agencies, including

MWE, GIA, MoOM, MAA, YFZPA, GALSUP, MPWR, MT, MIT, MFW, Yemen Sea Port Authority, CAMA and MoLA, the three governors, civil society groups and the private sector. The SC will meet on a semi-annual basis to approve work plans, nominate individuals to participate in bid evaluation and short-list approvals and manage public relations concerns that may be referred to it by the PMU. The PMU will provide administrative services to the SC, including organizing meetings, proposing the agenda and preparing minutes.

6. Climate change modeling and related research and data collection prescribed under component 2 will be carried out by the most appropriate organization as will be identified by a study under sub-component 2.1. The Aden-based Fisheries Authority (FA) will be considered as one prominent candidate. As the former National Marine Research Center, the Aden FA is currently the main marine research authority in Yemen with branches in Hodeidah and Mukallah (climate research is only performed at the Aden FA). The FAs were formed under the MFW with the support of the FRMCP, and are supervised by the Minister MFW. While Government provides the budget for salaries, research activities depend on donor-funded projects' allocations. The Aden FA's physical capacity for research is overall acceptable; however, management and linkages with other relevant institutions have been identified as requiring support.

7. The chart below summarizes the main bodies responsible for project implementation:

Project Implementation Arrangements



Part 3: Project Preparation Grants

PILOT PROGRAM FOR CLIMATE RESILIENCE **Project/Program Preparation Grant Request (1)**			
1. **Country/Region**:	Republic of Yemen	2. **CIF Project ID#**:	(Trustee will assign ID)
3. **Project Name:**	Climate Information System and PPCR Program Coordination		
4. **Tentative Funding Request (in USD million total) for Project**[76] **at the time of SPCR submission (concept stage):**	*Loan:*	*Grant: USD 19 mil*	
5. **Preparation Grant Request (in USD million):**	USD 500,000[77]	*MDB: World Bank*	
6. **National Project Focal Point**:	TBD		
7. **National Implementing Agency (project/program):**	*Environment Protection Authority*		
8. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	*Headquarters-PPCR Focal Point: Kanta Kumari Rigaud*	*Task Team Leader: Lia Sieghart*	

9. **Description of activities covered by the preparation grant:**

The grant will finance feasibility and design work on a) hydrometeorology systems upgrading, forecasting and warning systems, and climate information system. The grant will also support in b) carrying out preparatory work for setting up the PPCR Program Coordination.

a) <u>Hydrometeorology systems upgrade</u>

User requirements

- Assess the user requirements for weather, water and climate data and knowledge to inform the design of the hydromet and hazard monitoring system

Hydromet and hazard monitoring and forecasting

- Design a real-time hydro-meteorological observation network,
- specify appropriate forecast models, analytical methods and production system hardware and software,
- Propose effective data sharing protocols,
- Structure a capacity building strategy for maintaining the hydromet system,
- Specify needs and recommendations for operations and maintenance of the system.

Multi-Hazard Early Warning

- explore options to develop a multi-hazard early warning system for weather, water and climate related hazards with the capability to provide impact related warnings on all relevant timescales
    - include national, local and community partners

[76] Including the preparation grant request.
[77] Funds will not be transferred at Sub-Committee endorsement

- explore feasibility of joint warning system shared between different stakeholders.

Service Delivery

- Design the service delivery system for weather, climate and water services including the climate information system

Training

- Outline the training requirements to increase the capacity and capability of all of the partners to produce and use the climate information system and warning services.

Implementation

- Develop a phased strategy for the implementation of the program

Sustainability

- Identify needed policy and institutional reforms and recurrent resource requirements
- Analyze potential for revenue generation and / or cost sharing mechanisms between government agencies

b) <u>Preparatory work for setting up PPCR Program Coordination:</u>

- To carry out preparatory activities (assessments) for setting up a coherent mechanism for PPCR oversight, knowledge management and information sharing.
- To carry out a capacity gap analysis and a budgeted plan of actions to define a road-map for program coordination.
- Develop the generic TORs for the Project Directors with emphasis on gender related aspects
- To develop the TORs for a community and awareness program which will govern the overall PPCR implementation.

10. **Outputs:**

Deliverable	**Timeline**
(a) Draft report on hydromet services delivered	4 months from contracting
(b) Final report hydromet services delivered	6 months from contracting
(c) Report on PPCR Program Coordination as well as road map prepared	6 months from contracting

11. **Budget (indicative):**

Expenditures[78]	**Amount (USD) -** estimates
Consultants	390,000
Equipment	
Workshops/seminars	35,000
Travel/transportation	5,000
Others (admin costs/operational costs)	30,000
Contingencies (max. 10%)	40,000
Total Cost	**500,000**
Other contributions:	
• Government	
• MDB	
• Private Sector	

[78] These expenditure categories may be adjusted during project preparation according to emerging needs.

• Others (please specify)	

12. **Timeframe** (tentative)

Submission of pre-appraisal document for PPCR Sub-Committee Approval: tbd
Expected Board/MDB Management[79] approval date: tbd

13. **Other Partners involved in project design and implementation**[80]:

GFDRR's Weather and Climate Information and Decision-Support Systems (WCIDS) program is providing assistance with the preparation of the hydromet component of this investment.

Yemen's Civil Aviation and Meteorological Authority (CAMA) will be the coordinating body within the Government between all agencies that collect and use hydromet data. Further partnerships will be sought through CAMA with these other agencies.

14. **If applicable, explanation for why the grant is MDB executed:** N/A

15. **Implementation Arrangements** (incl. procurement of goods and services)**:**

This PPG will be recipient-executed, with the Environment Protection Authority as Executing Agency. CAMA will execute those portions of the PPG pertaining to hydromet services. World Bank procurement, financial management and social/environmental safeguard standards will apply.

[79] In some cases activities will not require MDB Board approval
[80] Other local, national and international partners expected to be involved in design and implementation of the project.

PILOT PROGRAM FOR CLIMATE RESILIENCE

Project/Program Preparation Grant Request[81] (2)

16. **Country/Region**:	Yemen	17. **CIF Project ID#**:	(Trustee will assign ID)
18. **Project Name:**	Improving the Climate Resilience of the Water Sector		
19. **Tentative Funding Request (in USDmillion total) for Project[82] at the time of SPCR submission (concept stage):**	*Loan: USD 23.0 M*	*Grant: USD 2.0 M*	
20. **Preparation Grant Request (in USDmillion):**	USD 500,000[83]	*MDB: World Bank*	
21. **National Project Focal Point**:	TBD		
22. **National Implementing Agency (project/program):**	Ministry of Water and Environment/ MAI/NWRA		
23. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	*Headquarters-PPCR Focal Point: Kanta Kumari Rigaud* *kkumari@worldbank.org*	*TTL: Lia Sieghart* *lsieghart@worldbank.org*	

24. **Description of activities covered by the preparation grant:**

The grant will cover analytic work, preparatory activities, workshops and training as follows:

(i) **Prepare a communication and awareness program** identifying content, target audience, tools, timelines and costing to increase stakeholders' understanding of climate change, adaptation in the selected rural communities where participatory watershed activities, wastewater treatment and reuse technologies and practices, and flood control innovative technologies would be introduced. The program will be implemented through workshops mostly during the course of the project although some high priority awareness raising workshops will already take place during the preparation phase as part of the activities below.

(ii) **Collect information to assess the status of the hydro-meteorological data collection and dissemination network in Yemen and indentify weaknesses and gaps that impede it utilization for national and local water resources planning and climatic risk management.** Determine what additional institutional capacity, information and equipment will be needed to ensure availability at governorate and lower levels for local-level watershed planning and management, and make recommendations for studies, and procurement of technical assistance and equipment.

(iii) **Review the existing water policy and regulations and determine what modification, additions or new instruments are required** to improve national and local level regulation of groundwater use, and enable local level participation in the planning of climate-resilient flood management and protection at the watershed level. Make recommendations for improved governance of regulations and capacity-building for local stakeholder and water user groups

[81] A separate template needs to be presented for each project and program preparation grant request listed in the SPCR.
[82] Including the preparation grant request.
[83] Funds will not be transferred at Sub-Committee endorsement

and how this is to be acheived.

(iv) **Review local-level institutions and water user groups at the watershed and local level to determine their capacity for implementing participatory planning and management** and develop a plan and pilots to build their capacity to enable them to better manage climate-related risks, manage floods and conserve groundwater.

(v) **Review current practices of wastewater disposal and assess the potential to utilize wastewater in agriculture.** Develop a short-list of potential pilot projects including investment needs and related training and capacity-building.

(vi) **Prepare a Project Implementation Manual (PIM),** including procedures, procurement, financial management, safeguards and M&E. The PIM will also include key ToRs, and a process for the screening, funding and M&E of adaptation measures to be funded by the project. An integrated M&E system incorporating climate resilience specific indicators for the water sector will be prepared and annexed to the PIM. It will include baseline figures for all agreed indicators as needed. It will identify incremental operating costs incurred by the project, including hiring of full time and part-time PMU staff, a local procurement assistant, international experts and an external auditor. It will detail the proposed financial arrangements and support to provide incentives to local communities and water-user groups to participate in undertake project activities.

(vii) **Provided Training** for project staff on procurement, financial management, safeguards and M&E.

25. **Outputs:**

Deliverable	**Timeline**
(a) Local Weather Network assessment	tbd
(b) capacity gap analysis	tbd
(c) adaptation demonstration strategic analysis	tbd
(d) communication and awareness program	tbd
(e) Project Implementation Manual	tbd
(f) Hiring of staff and experts (procurement and international technical expert), establishment of PMU, SC, FUs, financial management systems, bank accounts, GoY-YLNG agreement and MoU with CC modeling institution	tbd
(g) Workshops	tbd
(h)Training	tbd

26. **Budget (indicative):**

Expenditures[84]	**Amount (USD) -** estimates
Consultants	390,000
Workshops/seminars	35,000
Travel/transportation	5,000
Others (admin costs/operational costs)	30,000
Contingencies (max. 10%)	40,000
Total Cost	**500,000**
Other contributions:	

[84] These expenditure categories may be adjusted during project preparation according to emerging needs.

• Government	
• MDB	
• Private Sector	
• Others (please specify)	
27. **Timeframe** (tentative) Submission of pre-appraisal document for PPCR Sub-Committee Approval: tbd Expected Board/MDB Management[85] approval date: tbd	
28. **Other Partners involved in project design and implementation**[86]: The Ministries of Water and Environment (MWE), and of Agriculture and Irrigation (MAI) will be among the key partners in designing and implementing this investment.	
29. **If applicable, explanation for why the grant is MDB executed:** N/A	
30. **Implementation Arrangements** (incl. procurement of goods and services)**:** This PPG will be recipient-executed, with the MWE/MAI as Executing Agency. World Bank procurement, financial management and social/environmental safeguard standards will apply.	

[85] In some cases activities will not require MDB Board approval

[86] Other local, national and international partners expected to be involved in design and implementation of the project.

PILOT PROGRAM FOR CLIMATE RESILIENCE

Project/Program Preparation Grant Request (3)

31. **Country/Region**:	Republic of Yemen	32. **CIF Project ID#**:	(Trustee will assign ID)
33. **Project Name:**	*Improving Rural Livelihood through Adaptation in Rain-fed Agriculture (IRLARA)*		
34. **Tentative Funding Request (in USD million total) for Project**[87] **at the time of SPCR submission (concept stage):**	*Loan: USD 37.0 M*	*Grant: USD 9.0 M*	
35. **Preparation Grant Request (in USD million):**	*USD 400,000*[88]	*MDB: World Bank*	
36. **National Project Focal Point**:	*TBD*		
37. **National Implementing Agency (project/program):**	*Social Fund for Development (SFD) - Ministry of Agriculture and Irrigation*		
38. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	*Headquarters-PPCR Focal Point: Kanta Kumari Rigaud*	*TTL: Garry Charlier* *Co-TTL: Pierre Rondot*	

39. **Description of activities covered by the preparation grant:**

The grant will cover preparation costs of the IRLARA that includes both technical and operational preparations as well as consultation workshops and training. It will also cover the *additional* operating costs incurred to the SFD Agriculture and Rural Development Unit (ARDU) as the Project Implementation Unit.

(i) *Technical preparations*: Detailed technical study on integrated watershed management on the pre-selected RALP project sites, pre-feasibility study on Payment for Environmental Services, and a socio-economic baseline study in the new governorates, elaboration of a framework for environmental and social management, and preparation of communication strategy and action plan.

(ii) *Operational preparations:* Elaboration of operations/implementation manual, development of an integrated monitoring & evaluation system incorporating climate resilience specific indicators, and establishing a financial management system.

(iii) *Workshops and training:* There will be consultation workshops to validate the new governorates and communities, and preliminary communication workshops with participating communities. Training activities include short-term training on integrated disaster and climate risk management for key project personnel, training on strategic/operational planning, procurement and financial management M&E, that also includes more specific training on the relevant issues related to monitoring and evaluation of the PPCR-program as per the guidelines by the CIF admin unit.

40. **Outputs:**

[87] Including the preparation grant request.
[88] Funds will not be transferred at Sub-Committee endorsement

Deliverable	Timeline
(a) technical reports on integrated watershed management on pre-selected project sites, , and a, , and	tbd
(b) pre-feasibility report on Payment for Environmental Services	tbd
(c) socio-economic baseline in the new governorates	tbd
(d) Environmental and social management framework	tbd
(d) preparation of communication strategy and action plan	tbd
(e) Project Implementation Manual	tbd
(g) Workshops and Training	tbd

41. **Budget (indicative):**

Expenditures[89]	**Amount (USD) –** estimates
Consultants	200,000
Equipment	50,000
Workshops/seminars	60,000
Travel/transportation	45,000
Others (admin costs/operational costs)	30,000
Contingencies (4%)	15,000
Total Cost	**400,000**
Other contributions:	
• Government	tbd
• MDB	tbd
• Private Sector	tbd
• Others (please specify)	

42. **Timeframe** (tentative)

Submission of pre-appraisal document for PPCR Sub-Committee Approval: tbd
Expected Board approval date: tbd

43. **Other Partners involved in project design and implementation**: The preparation team will also liaise closely with actors and development partners who are active in the sector, in particular, MAI, NWARA, IFAD, IFC, etc.

44. **If applicable, explanation for why the grant is MDB executed**: N/A

45. **Implementation Arrangements:**

The Grant will be executed by the Government of Yemen through the Social Fund for Development (SFD) and its Agricultural and Rural Development Unit both under the Ministry of Agriculture and Irrigation. SFD is currently an implementing entity for the World Bank-financed RALP Project; therefore fiduciary (procurement and financial management) and safeguard capacities should be consistent with the needs and requirements of the PPG.

[89] These expenditure categories may be adjusted during project preparation according to emerging needs.

PILOT PROGRAM FOR CLIMATE RESILIENCE

Project/Program Preparation Grant Request (4)

46. **Country/Region**:	Republic of Yemen	47. **CIF Project ID#**:	(Trustee will assign ID)
48. **Project Name:**	*Climate-Resilient Integrated Coastal Zone Management Project*		
49. **Tentative Funding Request (in USDmillion total) for Project**[90] **at the time of SPCR submission (concept stage):**	*Loan: 0*	*Grant: USD 20.0 M*	
50. **Preparation Grant Request (in USDmillion):**	USD 400,000[91]	*MDB: World Bank*	
51. **National Project Focal Point**:	*Mr. Anwar Noaman, Environment Protection Authority*		
52. **National Implementing Agency (project/program):**	*Environment Protection Authority*		
53. **MDB PPCR Focal Point and Project/Program Task Team Leader (TTL)**:	*Headquarters-PPCR Focal Point: Kanta Kumari Rigaud*	*TTL: Banu Setlur*	

54. **Description of activities covered by the preparation grant:**

The grant will cover analytic work, preparatory activities, workshops and training as follows:
Analytic work: (i) An Environmental and Social Impact Assessment, including an Environmental and Social Management Plan and a Resettlement Policy Framework for the project. **(ii) A coastal climate change modeling gap analysis** will be funded focusing on users, data types and sources, methods of data collection, staffing and skills, equipment and software and institutional linkages. The analysis will propose a permanent function for coastal climate modeling, as well as independent funding sources for the operation, maintenance and update of databases, equipment and skills beyond the life of the project. A budgeted plan of action addressing the identified gaps will be proposed for implementation by the project. **(iii) A capacity gap analysis** and a budgeted plan of action for climate-resilient ICZM will be carried out, focusing on key management elements and tasks as identified by the Yemen coastal Strategic Environmental Assessment funded by the BNPP. The action plan will dictate activities to be funded once the project is launched. **(iv) An adaptation demonstration strategic analysis** will be funded focusing on each of the three project sites. The analysis will look at initiatives in Yemen and other countries/projects (such as the BNPP TA, FRMCP, the Netherlands Climate Assistance Programme and the UNDP/GOY-funded Economic Diversification Support Programme which has recently been launched) as well as the National Adaptation Plan of Action (NAPA), and offer a menu of best-practice/win-win options of alternative livelihood schemes, mechanisms for improved ecosystem services and climate-resilient infrastructure. Of this compendium of options, low-hanging fruits will be identified and prioritized for implementation by the project.
Preparatory activities: (i) A communication and awareness program will be prepared, identifying content, target audience, tools, timelines and costing to increase stakeholders' understanding of climate change, adaptation, ICZM and the project in specific. The program will be implemented mostly during the course of the project although some high priority awareness raising workshops will already take place during the preparation phase (see point iii below). **(ii) Preparation of a Project Implementation Manual** (PIM), including implementation procedures, procurement, financial management, safeguards and M&E.

[90] Including the preparation grant request.
[91] Funds will not be transferred at Sub-Committee endorsement

The PIM will also include key ToRs, and a process for the screening, funding and M&E of adaptation measures to be funded by the project. An integrated M&E system incorporating climate resilience specific indicators will be prepared and annexed to the PIM. It will include baseline figures for all agreed indicators as needed. **(iii) Incremental operating costs** incurred by the establishment of a financial management system for the project; hiring of full time and part time PMU staff, a local procurement assistant, international experts and an external auditor; establishment of a project Steering Committee and two Field Units; opening of bank accounts; purchasing of equipment and furniture for PMU and Field Units; rental of cars, gas and insurance; signing of a co-financing agreement between GoY and the Yemen Liquefied Natural Gas (YLNG); preparation and signing of a MoU between EPA and an international climate change modeling institution.

Workshops and training: (i) Highest priority workshops identified by the communication and awareness program, enhancing awareness and securing endorsement of key coastal and national stakeholders (as identified by the consultancy) about climate change, adaptation, ICZM and planned project objectives, outcomes and activities. **(ii) Training** for project staff on procurement, financial management, safeguards and M&E.

55. **Outputs:**

Deliverable	**Timeline**
(a) Environmental and Social Impact Assessment	tbd
(b) coastal climate change modeling gap analysis	tbd
(c) capacity gap analysis	tbd
(d) adaptation demonstration strategic analysis	tbd
(e) communication and awareness program	tbd
(f) Project Implementation Manual	tbd
(g) Hiring of staff and experts (procurement and international technical expert), establishment of PMU, SC, FUs, financial management systems, bank accounts, GoY-YLNG agreement and MoU with CC modeling institution	tbd
(h) Workshops	tbd
(i)Training	tbd

56. **Budget (indicative):**

Expenditures[92]	**Amount (USD) -** estimates
Consultants	224,000
Equipment	50,000
Workshops/seminars	50,000
Travel/transportation	30,000
Others (admin costs/operational costs)	30,000
Contingencies (4%)	16,000
Total Cost	**400,000**
Other contributions:	
• Government	TBD
• Private Sector (YLNG)	300,000 (national consultant)

57. **Timeframe** (tentative)

[92] These expenditure categories may be adjusted during project preparation according to emerging needs.

Submission of pre-appraisal document for PPCR Sub-Committee Approval: tbd Expected Board approval date: tbd
58. **Other Partners involved in project design and implementation**[93]: The Governorates of Hodeidah, Shabwa and Aden will be key partners in the design and implementation of this project, along with the communities in those areas. The private sector will also be included in implementation through the national Steering Committee.
59. **If applicable, explanation for why the grant is MDB executed:** N/A
60. **Implementation Arrangements** (incl. procurement of goods and services)**:** The World Bank will enter into a grant agreement with the Government of Yemen. The private sector co-financing (YLNG) will be used to hire a national consultant who will coordinate the preparatory activities until a PMU has been established with a project director and trained to take over, under the supervision of the EPA Chairman. EPA will hire consultants and sign off any other procurement activity. Procurement and financial management of all PPG activities will be carried out by the Yemen PPCR procurement and financial management staff, who will continue to support the project after it is launched. The Yemen PPCR PCU meets the necessary procurement and fiduciary requirements for the World Bank.

[93] Other local, national and international partners expected to be involved in design and implementation of the project.

Annex 1: The Regulation Organizing Tasks of the Higher Committee for Climate Changes

Council of Ministers Decree No. (349; 2009), concerning approval of the draft The Regulation Organizing Tasks of the Higher Committee for Climate Changes. [translated from Arabic]

The Prime Minister,
Having perused

- The Constitution of the Republic of Yemen;
- Law No. (26) For the year 1995, concerning Protection of the Environment;
- Law No. (8) For the year 2007, concerning formation of the Cabinet; as amended by Law No. (105) For the year 2007 and its amendments For the year 2008;
- The Republican Decree No. (101) For the year 2005, concerning the establishment of Environment Protection Authority;
- The Council of Ministers Decree No. (124) For the year 2009, concerning approval of the National Document for Adaptation to Climate Changes;

And, based on proposal submitted by the Minister of Water & Environment and the Deputy Prime Minister, Minister of Planning & International Cooperation.

After Approval of the Council of Ministers;

Resolved the following

Chapter One
The Definitions

Article (1): This Regulation shall be called "The Regulation Organizing Tasks of the Higher Committee for Climate Changes."

Article (1): For purposes of application of this Regulation, the expressions and phrases mentioned below will be intended to mean the following significations, unless the context indicates otherwise:

Republic: The Republic of Yemen
The Ministry: The Ministry of Water & Environment.
The Minister: The Minister of Water & Environment.
Committee Chairman: The Chairman of the Higher Committee for Climate Changes>
The Authority: The Public Environment Protection Authority.
The Chairman of the Authority: The Chairman of the Public Environment Protection Authority.
The Higher Committee: The competent Higher Committee responsible for climate changes issues regulated by the UN Climate Change Framework Convention approved by Law No. (3) For 1995, and Kyoto protocol attached to the convention approved by Law No (32) for the year 2004.
Competent Authority: Any Ministry, authority or institution performing specific activities related to climate changes.
The Convention: UN Climate Change Framework Convention.

Kyoto protocol: Kyoto protocol attached to the UN Climate Change Framework Convention.
Climate change: A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.
Sustainable Development: A development that meets the needs of the present times with no damage to the requirements of the future generations.

Chapter Two
Principles & Objectives

Article (3): The main goal for this Decree is to:

a. Assist the Republic of Yemen in achieving a sustainable development through utilization of funding opportunities and mechanisms available through the Conventions; contribute in achieving the final objective of the Convention in the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.
b. Guarantee the implementation and achievement of activities and projects contributing to the achievement of sustainable development in the Republic of Yemen.
c. Cooperation and coordination among different competent agencies in the Republic in the preparation and implementation of climate changes related activities.

Chapter Three
Establishment of the Higher Committee and its tasks

Article (4): A Climate Change Higher Committee shall be established as follows:

1. Deputy Prime Minister, Minister of Planning & International Cooperation **Chairman**
2. Minister of Water and Environment **Vice Chairman**
3. Minister of Agriculture & Irrigation **Member**
4. Minister of Fishery **Member**
5. Minister of Finance **Member**
6. Minister of Transport **Member**
7. Minister of Telecommunications & IT **Member**
8. Minister of Oil &Minerals **Member**
9. Vice Minister of Local Administration **Member**
10. Deputy Minister of Planning & International Cooperation **Member**
11. Chairman of Public Environment Protection Authority **Member**
12. Chairman of Public Water Resources Authority **Member**

Article (6): The Climate Change Higher Committee will be responsible for application of the provisions of the Regulation, provision in other related Laws in force, international conventions and protocols endorsed by the Republic of Yemen.

Article (7): The Climate Change Higher Committee will conduct the following tasks:

1. Supervision on climate changes related activities and programs;
2. Coordination of climate changes related activities and guarantee their integration with activities in different sectors;
3. Inclusion of climate changes related issues in the national strategies and plans, as well as in the sectoral strategies and plans;
4. Review and approval of projects and programs annual documents in the climate changes area;
5. Conduct monitoring and evaluation for activities and programs in the climate changes area;
6. Coordination and cooperation with donor states and organizations regarding climate changes related activities and programs

Article (8): The Climate Change Higher Committee shall prepare detailed internal regulations and rules related to implementation of its tasks.

Article (9): The Climate Change Higher Committee shall submit an annual report to the cabinet on activities related to projects with green development mechanisms.

Chapter Four
The Technical Committee

Article (10): The Climate Changes Higher Committee will form a technical committee with membership of representatives of related agencies to tasks such as, and not exclusive to:

1. Preparation of technical reports and documents regarding climate changes related activities in different sectors;
2. Study and review reports and documents regarding climate changes related activities, and submission of proposal and recommendations to the Climate Changes Higher Committee for approval;
3. Data collection from different related sectors be utilized in the preparation and implementation of the climate changes adaptation programs and activities;
4. Undertake any other activities to be assigned by the Higher Committee.

Chapter Five
The Committee Secretariat

Article (11): A technical secretariat performs as vocal point for communications on the UN Climate Changes Framework Convention, to be based in the Environment Protection Authority. This secretariat shall assist, follow up and coordinate for the Committee in the following tasks and activities:

1. Coordination of daily activities for the Committee and the Technical Committee;
2. Preparation of meetings for the Higher Committee and the Technical Committee;
3. Communication with all agencies related to climate changes;
4. Undertake any other activities to be assigned by the Higher Committee.

Chapter Six
General Provisions

Article (13): The Climate Changes Higher Committee shall follow a complete transparency, including dissemination of all procedures, decisions and annual reports related to climate changes activities, projects and programs.

Article (14): The Chairman of Climate Changes Higher Committee shall approve all other regulations, rules and decisions to be made for the propose of application the provisions of this Regulation, to be issued after approval by the Committee, without prejudices to the provisions of the provisions Laws in force.
Article (56): This law is effective as of its issuing date, to be published in the official gazette.

Issued in the Presidency of the Council of Ministers.
Dated ……. A.H. (, 2009)

AbduRahman Fadhl Al-Eriany
Minister of Water & Environment

Dr. Ali Mujauar
Prime Minister.

Annex 2: Key PPCR-Related Institutions in Yemen

Institution	Major Roles and Responsibilities
Ministry of Water and Environment (MWE)	The Ministry of Water and Environment, formerly the Ministry of Tourism and Environment was established in 2003. It formulates, monitors and evaluates environmental policies, plans and programs; coordinates with national and international institutions and organizations working on environmental matters and climate change; development and utilization of human resources in environment and climate change fields; Participate and coordinate with stakeholders in preparing the national disasters strategy; Identify the locations and activities that may contribute to mitigation of natural environmental disaster. The MWE is a member of the IMCCC. In 2004 the Directorate of Environmental Emergencies and Disasters (DEE) under the MWE was established through a ministerial decree. The DEE is responsible for reporting on progress in Yemen on the five priority areas of action outlined in the Hyogo Framework for Action (HFA), to the UN International Strategy for Disaster Risk Reduction (UNISDR) – UNISDR being the agency that is responsible for monitoring progress on the Hyogo Framework.
Ministry of Oil and Mineral Resources: - Geological Survey and Mineral Resources Board (GSMRB) - Yemen National Seismological & Volcanological Observatory Center (YSVOC; Dhamar)	The Ministry of Oil and Mineral Resources is a member of the IMCCC. The GSMRB carries out landslide, floods, volcano, and earthquake risk mapping, and anlysis with a fairly good infrastructure in place and over 15 years of experience. Nevertheless strengthening of technical and human capacity would be needed. Yemen National Seismological & Volcanological Observatory Center (YSVOC) in Dhamar is responsibile for monitoring and studying the volcanic and earthquake activity in Yemen. In the mid of 1993, YSVOC installed the Yemen Strong Motion Network of 18 SSA-2 stations distributed in the main cities of the country. By the end of 1994, NSOC started the installation of the digital National Seismological Network which consist of 18 Mars-88 stations distributed all-over the

	country. Six equipped with BB seismometers, the others equipped with short period ones. In 1996, YSVOC installed three stations SS-1 based Visual Telemeterd Network. Beside its main objective, YSVOC conducted and published many landslide and rock avalanches studies. Since 2009 the YSVOC has been working with the World Bank DRM team to establish a national-regional earthquake and volcanic hazards data exchange program, and the upgrading of its knowledge management capacity. Since 2008 the GSMRB has been designated by the Government of Yemen as the focal point for the Global Facility for Disaster Reduction and Recovery (GFDRR) for the drafting of three Risk Assessment Studies, namely the: (i) National Probabilistic Risk Assessment; (ii) the Al Mahara and Hadramout Probabilistic Risk Assessment, and (iii) the Sana'a Republic of Yemen, Natural Risk Evaluation and Risk Planning. The GSMRB remains a strong DRM partner of the World Bank and is planning to scale up its DRM capacity and reach by establishing a Geo-Hazard Risk Management Unit (GHRMU).
Ministry of Planning and International Cooperation (MOPIC)	MOPIC chairs the IMCCC. MOPIC is in charge of poverty monitoring and it mandated to implement the poverty reduction and reform agenda.
Environment Protection Authority (EPA)	Emerged in 2001 out of the Environment Protection Council (EPC), which was established in 1991. The EPA is an implementing entity under the Ministry of Water and Environment. Whereas the EPC had only a coordinating role; the EPA has the mandate to implement environmental legislation and to execute relevant programs and projects in compliance with the Environmental Law No. 26 (1995). The EPA was leading the development of the Initial Communication to the UNFCCC, the NAPA, is developing now the Second National Communication to the UNFCCC, the National Biodiversity Strategy and Action Plan, the National Environmental Action Plan, and others. The EPA holds Branches in Al Hudaydah, Aden, Mukalla and on Socotra Island, as well as extension offices in most Governorates. The EPA is a member of the IMCCC and the Technical Secretariat servicing the IMCCC is based in the EPA. The Women

	and Environment Unit is part of the EPA, and will also play a crucial role in stricing a gender balance throughout PPCR implementation.
Ministry of Fish Wealth (MoFW)	The mandate of the MoFW is the management and development of Yemen's fish resources. The Ministry's main function is to regulate fishing (subsistence, artisanal and commercial), to issue licenses and to supervise processing and marketing of fish and fisheries products for local consumption as well as export. The MoFW, through its Department of Monitoring and Surveillance is responsible for the enforcement of laws and regulations concerning marine resources. It maintains offices in all coastal cities. The MoFW is a member of the IMCCC.
Marine Science and Resource Research Centre (MSRRC)	The MSRRC is an advisory body to the MoFW. It provides advice to the Ministry on fish stock assessment and management, fish landings, fishermen related commercial and artisanal activities. It consists of three Departments: Fisheries, Oceanography and Benthos. In additional it maintains a small pollution control centre at Al-Buraiqua (Aden). The head office of the MSRRC is located in Aden, with two branches, in Al Hudaydah and Al Mukalla.
Ministry of Higher Education (MoHESR)	There are currently three ministries with responsibility for education in Yemen: (a) the Ministry of Education (MOE) is responsible for pre-basic, basic and general secondary education; (b) the Ministry of Technical Education and Vocational Training (MoTEVT) is responsible for post-basic and post-secondary technical education and vocational training (TEVT); and (c) the Ministry of Higher Education and Scientific Research (MoHESR) which is responsible for university education. There is – no relevant University program in Atmospheric Sciences. Climate related subjects are discussed in context of adaptation in life sciences (agriculture, biology), in physical sciences (physics), and in geo-sciences (geography). There are currently 8 established public universities and 13 private universities, which in 2006/07 enrolled 230,000 students (of which approximately 80 percent in public universities). The MoHESR has developed a National Strategy for the Development of Higher Education (NSDHE) designed to address the challenges faced by the

	sector. The National Strategy was approved and adopted by the Government in 2006, and a plan of activities prepared, focusing on the following four areas of reform: (i) quality improvement; (ii) governance and management; (iii) diversification of institutions and programs; and (iv) financial resources. Since 2009 the World Bank DRM team has been working with the Sana'a University Department of Engineering to establish a master degree in DRM and Climate Change Adaptation.
Ministry of Agriculture and Irrigation (MAI)	The Ministry is mandated with the formulation and implementation of agricultural development policies and plans, most of which will be impacted by climate change. It provides extension services to farmers and communities on adaptation approaches. The MAI has a good overall implementation capacity, having staff in each Governorate and at district level. The MAI is a member of the IMCCC. The Agricultural Research and Extension Authority (AREA), and the Irrigation Sector at the MAI are collecting some climate data which 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. As weather stations for data collection are under different agencies, each collecting data to meet its own mandate. The MAI is a member of the IMCCC. AREA is mandated with the supervision and coordination of national agriculture research activities, technical supervision of extension activities and evaluation and certification of research results in the country. It conducts research and survey on various types of climate resistant crops.
Civil Aviation and Meteorology Authority (CAMA)	CAMA is located in Sana'a and is mandated with with the weather forecast as well as the forecast for aviation purposes. Is with the EPA, AREA and NWRA one of the national entities collecting and processing the limited available climate data, data are of typically daily resolution with an average record length of around 10 yrs or less. A database including tools for data evaluation does not exist and record length is often too short for most of the time-series analysis as well as density is

	limited which reduces the chance to test data by comparison to a neighboring station. Meteorology data is not systematically shared with national authorities as witness by the recent completion of risk assessment studies and national atlas which all have no climate data.
Ministry of Interior - National Disaster Management Unit - General Directorate of Civil Defense	The National Disaster Management Unit (NDMU), housed within the Civil Defense General Directorate (CDGD) under the Ministry of Interior is the main DRM national agency. Since 1997 the Unit in the Civil Defense Directorate has the mandate to focus on disaster management and response in Yemen. As of more recently thanks to the Executive By-law and the Republican Decree (N°386) became the basis for the Supreme Council of Civil Defense. The Council is responsible for providing policy direction, approving plans for disaster preparedness and response, and defining the tasks and responsibilities of each ministry/agency, actors and stakeholders before and during any emergency. It is chaired by the Minister of Interior, and includes key ministries as members. Additionally, in order to develop an effective, comprehensive and integrated disaster risk management system, the Civil Defense General Directorate was accorded the status of an authority, with greater managerial and financial autonomy. Although existing institutional mechanism are inadequate to guarantee disaster preparedness at all levels significant improvements have taken place. For instance in 2006 the National Disaster Management Unit has developed a National Disaster Management Contingency Plan. This plan spells out in detail, the role of key line ministries before, during, and in the post disaster emergency phase. It provides checklists for essential activities to be executed in the different phases of a disaster, as well as a list of essential contacts. Additionally, the Ministry is mandated with the implementation of a National Disaster Management Contingency Plan; as well as well as to carry out capacity building at national and governorate levels in disaster planning, preparedness, management, mitigation, emergency response and recovery. Finally the

	DRM Unit, thanks to the support from UNDP has developed 5 national operational rooms, most of which are fully equipped. Nevertheless none of these rooms are fully operational.
Ministry of Telecommunications and Information Technology - Remote Sensing and GIS Centre	National depository of base maps for Yemen and satellite imagery with an experience of 4 years. The Remote Sensing and GIS Center has recently established a GIS and Remote sensing training facility which it intends to use to provide training to all national practitioners. Additionally since 2009 it has engaged the MNA DRM Team to start develop a community multi-hazard/risk mapping using Geographic Information System (GIS), and by acquiring GIS software and development of risk atlas.
Natural Water Resources Authority	NWRA is a member in the IMCCC. NWRA is an implementing entity under the Ministry of Water and Environment. NWRA is one of the entities collecting and processing the limited available climate including precipitation data, is developing a proposal for early warning system at river basin levels both for warning communities about hazards, as well as for optimal management of flood control structures.
Ministry of Local Administration (MoLA)	MoLA is mandated with enforcing the Local Authority Law (4/2000; approved on February 10, 2000) which provides a clear and comprehensive legislative framework for decentralization based on the following principles: (a) broadened popular participation through elected local councils: (b) financial decentralization; (c) decentralization of administrative and services delivery functions. According to the Law considerable responsibilities for (i) infrastructure development and services delivery, should be handed down to local councils and their administrations. These include responsibility for water supply and sanitation, rural electricity, rural roads, education, health, agriculture development, and municipal services. In time, local councils will also need to take an active role in two critical, if less conventional, areas of local public sector responsibility: (ii) the protection of the environment and management of natural resources and (iii) the promotion of local economic development. While the Local Authority Law 4/2000, provides a good

	framework for improving local governance in Yemen, much remains to be done to implement its fiscal and administrative dimensions and to make decentralization work on the ground. MoLA is a member of the IMCCC.

Annex 3: External Technical Review

UNIVERSITY OF MASSACHUSETTS
AMHERST

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130 Natural Resources Road
Amherst, MA 01003-9293

Department of Civil and
Environmental Engineering

voice: 413.577.2337
fax: 413.545.2202
http://www.umass.edu/cee

October 8, 2011

REFERENCE: Review of the Yemen SPCR

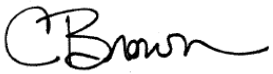
Dear Lia Sieghart:

Please find attached my review of the Yemen Strategic Plan for Climate Resilience (SPCR). I found the SPCR to fully meet the general criteria listed in the Terms of Reference and the specific criteria related to the Pilot Program for Climate Resilience.

Given the satisfaction of these criteria, my review has focused on opportunities to strengthen the implementation of this plan as it moves forward. I have made recommendations for some specific activities that may or may not be implicitly planned in the general activities described in the SPCR. While I do believe these activities are very important in the implementation of the plan, I do not believe that the plan requires revision to address these points. Rather the hope is that this review or the ideas expressed in it may be carried forward into the next phase of activities.

I am pleased to address any questions or concerns related to this review.

Sincerely,



Casey Brown, PhD, P.E.
Assistant Professor

Yemen
Strategic Program for Climate Resilience (SPCR)

Summary of Written Comments Received from External Technical Reviewer

Comments have been received from Dr. Casey Brown on October 11, 2011

Comments	Team Response
Overall Comments on General Criteria	
Given the context, the proposed SPCR focuses on three "pillars" related to (1) mainstreaming climate resilience through an integrated cross-cutting approach, (2) knowledge generation and management, and (3) implementation of adaptation actions. These pillars are consistent with the needs to create the ability to manage change as it comes in an uncertain future	Thank you.
The proposed activities focus on four areas, the development of a climate information system, building resilience in the water sector, adaptation in rainfed agriculture and integrated coastal zone management. These focus areas are logical in that they represent opportunities for much progress, given that much needs to be done, and if successful will contribute real development achievements regardless of how future climate evolves. They represent development priorities and given their sensitivity to climate, are natural priorities for building climate resilience.	Thank you.
In the opinion of this reviewer the overall plan is well thought out, logical, and clearly builds from priorities identified in the National Adaptation Program of Action (NAPA). It satisfies the general criteria of the Pilot Program for Climate Resilience. In particular, the plan is well coordinated with the state of development and capacity in Yemen, is technically sound and adequately addresses priority issues.	Thank you.
Specific Criteria	
The SPCR clearly addresses the specific criteria associated with PPCR in terms of addressing climate risk assessment, coordination with institutions at all levels, and focus on prioritized activities and stakeholder engagement.	In addition every effort will be made during the detailed preparation and implementation phase to establish operational links and synergy among the four components.

Comments	Team Response
Consultation has been extensive, both with the public sector of Yemen, with other donors, and the stakeholders of Yemen. Continued dialog with these groups is clearly critical, given the nature of the planned activities which rely on "buy-in" at the lowest levels to the need for building climate resilience. As a whole, the SPCR can be seen as a plan for a participatory approach to building climate resilience, providing information for those who best know their opportunities and constraints for action. Thus building belief in the need for information, the demand, will be essential throughout the implementation of this plan.	The overall program will support bottom up planning and will support the devolution of responsibility for implementation to participating local communities.
Recommendations (Climate Information System)	
The planned development of a Climate Information System represents a very pragmatic approach to building climate resilience. Depending on how it is implemented, it also could be a missed opportunity for actually realizing resilience in the water, agriculture and potentially other sectors that could benefit. There is often an assumption that providing improved information will necessarily lead to improved decisions. Experience has shown that this is not necessarily true. In fact, hopes for great benefits from investments in better weather and climate information often fall short due to the mismatch between what is provided and what is needed. For better information to yield climate resilience, the generation of climate information must be "demand driven." That is, there need be close coordination and collaboration between information providers, such as a meteorological agency, and the users of the information, such as the decision makers who manage water and agriculture, including individual farmers. Weather and climate information is often provided in forms that do not match the typical information that water managers and farmers use or can comprehend. Only through working together and through major efforts to enable true dialogue will the true potential of better information be realized.	We agree with the reviewer. In line with the guidance by the World Meteorological Organization (WMO), in the course of the preparation phase of the relevant investment in the SPCR it will be ensured that emphasis from production of forecasts and other products will be on delivering services based on user requirements. Thus we can expect that the proposed system will be developed in line with this concept, and with guidance from the international community. As a result, there will be close coordination between users and providers of these services.
It must be recognized that making decisions under climate and weather uncertainty is difficult, even with better information. The SPCR states that human and institutional capacity building is an objective and it is critical that this not be underemphasized in the development of the Climate Information System. Likewise, the objective of climate information for the sectors, a stated activity, must involve sector participation and dialogue as described	Agree. This is an underlying theme. A climate information system must be developed that meets user needs and expectations. Experience suggests that by including all stakeholders at the outset of the program, realistic requirements can be developed and met. This will be a priority of the climate service.

Comments	Team Response
above. Within these objectives and also the activities in the water, agriculture and coastal sectors, there must be capacity building in the area of making decisions under uncertainty for their sector and how climate information can be productively employed. This is a clear interaction area between the sectors, as actions that can be taken are best known by the sectors, although that capacity likely needs development as well. The Climate Information Service represents a wonderful opportunity to mainstream resilience in all the sectors, but the sectors must be involved in the design of such a system from the beginning.	
Recommendations (Water)	
The planning for building resilience in the water sector is logically designed to complement the National Water Sector Strategy and Investment Program (NWSSIP). Accordingly, there is a focus on decentralization of water management and also on enforcement and monitoring, seen as clear needs to manage the overdraft of groundwater resources. One may note that as management is decentralized, it is critical that a network to disseminate information, such as the two way flow of demand driven climate information, be maintained. Thus in the area of institutional reform, the provision of the climate information that will be available via the Climate Information System, and the ability to improve that information through dialogue of water managers with the information providers should be given strong consideration. In the area of capacity building, enhancing the ability of water managers to understand and use technical weather and climate information is a natural priority. A small example is ensuring that if early warning systems are implemented, that there is an ability for people to act on such warnings, both in terms of their comprehension of the warnings themselves and in having the resources available to take action.	Agree. Warning systems are only effective if there can be an effective response. It is important to ensure that the decision process is built into the warning system. This will ensure that people can act on warnings that are developed specifically in line with the capability of people to respond which will be addressed and closely adhered to during the preparation phase.
One issue that may be given special consideration while moving forward is how resilience can be engendered in the NWSSIP. The NWSSIP is an impressive plan of action for improving performance in the water sector. Interestingly, it makes no mention of climate change. This may be due to a shorter planning time frame or may be related to the lack of clear climate change projections, although hopefully this is not the case as this should not be an impediment to climate resilient planning. Nonetheless, there are important concerns related to climate change that warrant attention in all planning efforts related to water. The possible magnitude of impacts of	The proposed intervention in the water sector would attempt to strengthen the focus of the water program on issue related to the impact of climate change on the water sector. It is important to ensure that SPCR would assist the water program to include in its long term planning issues related to climate change and to articulate policy and action and public interventions needed to address these issues. The proposed activities under SPCR would assist the water program assess the impact of climate change on rainfed areas including variability in rain fall patterns and their implications on drought and flood

Comments	Team Response
climate variability and change are paradigm shifting, and thus some planning should be dedicated to these scenarios. Through such planning it may be possible to identify opportunities to take measures now at small cost that yield substantial benefits under future scenarios. The SPCR has an opportunity to complement this gap in the NWSSIP. A pragmatic way to do so would be to develop actions and activities that would be implemented specifically for two scenarios, one related to a dryer future and one related to a wetter future (where there may be opportunity). This could be complemented with planning for climate extremes related to variability, such as droughts and floods. In fact, one may discover that demographic issues overwhelm even these substantial potential changes in climate, but as yet this is not clear.	management. The water sector related investment in the SPCR includes a special component to asses options needed to address flood control in both dray and wet zones and the role of local communities in implementing such actions through well panned participatory models of collective actions.
Recommendations (Agriculture)	
The planning related to rainfed agriculture is perhaps the strongest part of the SPCR. It reflects an understanding that water will need to move from agriculture to domestic water supply and thus a focus on improving the productivity of rainfed agriculture is a focus. As noted earlier, weather and climate information can improve agricultural production, but there needs to be a match between what is provided and what can be used. Also, farmers need options in order to make changes when warranted based on the incoming information. The SPCR provides a clear framework for doing so, including thinking well beyond climate in terms of developing markets and moving into higher value agriculture. In fact, access to markets and the ability to diversify products are probably among the most important factors for resilience. Other specific options that may be considered for improving the climate resilience of agriculture are described in the Bill and Melinda Gates Foundation-funded report "Agricultural water management and climate risk" by Brown and Hansen.	Thank you for this helpful comment. It is important for both components related to improving productivity of rainfed agriculture and enhancing the efficient use of water under increasing scarcity and supported by the proposed SPCR to design joint actions related to achieving both objectives. The impact of climate change on rainfed agriculture would require careful assessment of option of diversification of agriculture and the selection of high value crops with high adaptability to changing weather conditions especially temperature and the variability of the onset of the rainfall season. Another issue which would need attention is to improve managing increasing risk of rainfed agriculture through supplementary irrigation using recycled treated water and innovative watershed management. During the detailed design and preparation phase, the SPCR would address these issues and would propose testing several options related to issues related to the role public policy, modern rainfed agriculture and supporting water technology, and community participation.
Recommendations (ICZM)	
The actions planned for the coastal sector focus on the implementation of Integrated Coastal Zone Management. Specific activities are planned and they build from priorities in the NAPA. It's not entirely clear as yet how the uncertainty of future sea levels will be incorporated into ICZM. This need not be an impediment. As noted earlier, planning for coastal zones has long occurred amid rising sea levels (and in some cases falling sea levels due to	Thank you for the recommendation. The team will review the new sea level change planning policy released by the US Army Corps of Engineers and incorporate in the project as relevant in the preparation phase. The proposed intervention in the ICZM sector acknowledges the

Comments	Team Response
glacial isostatic adjustment) and there are standard methods for doing so. Consideration may be given to the new sea level change planning policy released by the US Army Corps of Engineers which has carefully considered the implications of climate change on sea level and developed a pragmatic and implementable planning strategy.	absence of sufficient infrastructure to prevent adverse impact of sea level rise and extreme weather events. The project activities would include soft and hard options to address issues related to sea level rise, storm surges, etc. One set of activities under the project could include expanding green-belts and buffer zones by planting and replanting mangroves and palms; establishing and maintaining nurseries that provide cultivars and other materials; decreasing impacts from floods/drought through rain water retention; wetland conservation; climate-resilient environment friendly aquaculture and soft protection (e.g., beach nourishment and wetland construction and restoration). Another set of activities under the project could include demonstration of climate resilient infrastructure at all project sites such as stone walls to protect from storm surges, coastal defense and walls for areas vulnerable to erosion, etc. In addition, the project will fund the development and implementation of a communication and awareness raising program on impacts of climate change and ICZM at national and local levels.

Annex 4: Results and Performance Framework

Component	Outputs	Outcomes	Indicators	Critical Conditions
		Program-level results		
Institutions	Strengthening of IMCCC as national coordinating body for government support on climate change and vulnerability Guidance and input from IMCCC on climate resilience to all major national development plans Strengthening of the Technical Advisory Group as a permanent forum for dialogue between government, CSOs, private sector on climate resilience	Improved institutional structures and processes to respond to climate change and climate variability	Quality of participatory planning process (as assessed by private sector, CSOs, and other stakeholders) Extent to which development decision making is based on country-specific climate science, local knowledge and vulnerability studies	Strong mandate for IMCCC within Government Continued legitimacy of IMCCC/Technical Advisory Group process in the eyes of non-government stakeholders
Mainstreaming of climate resilience into poverty reduction and develop. plans, strategies	Main development policies and sectoral plans integrate climate factors and climatic governance instruments are established and used	Climate resilience is incorporated into development programs and investment plans	Number of revised strategies/plans which clearly address climate resilience Extend to which development decision making is made based on country-specific climate science, local climate knowledge and (gender-sensitive) vulnerability studies	Closer cooperation among departments developing sectoral strategies Timely interventions by IMCCC on sectoral strategies under development Line Ministries and departments have a good understanding of climate challenges

Component	Outputs	Outcomes	Indicators	Critical Conditions
				National institutions and local government actively participate in climate-related debates
Increased resilience in economic, social and eco-systems to climate variability and change	Increased investments which explicitly take into account climate change and variability	Increased capacity to withstand and/or recover from the effects of climate change and variability in water, agriculture and coastal zone resources Sectoral policies incorporate climate change in their investments Improved resilience of production systems to climate change	% of households adopting climate resilient practices Degree to which local communities are empowered to manage local watersheds and water resources Quality improvement in flood control, irrigation services and in increasing productivity among farmers in participating communities. Uptake of water recycling methods among farmers and communities Number of community alternative income generation sub-projects based on climate-resilient agriculture initiated % of coverage of new risk management and social protection measures for households Availability of zoning, management plans and	Successful implementation of PPCR investments Uptake and replication of best practices No unexpected worsening of climate change predictions for Yemen

Component	Outputs	Outcomes	Indicators	Critical Conditions
			construction codes for the coastal zone, integrating climate adaptation considerations Availability of a prioritized menu of best-practice options of alternative income sources, mechanisms for improved ecosystem services and climate-resilient infrastructure for coastal zone management	
Knowledge and awareness	Knowledge management function of PMU, and within each investment project Two-way information flow through Technical Advisory Group and IMCCC	Increased knowledge & awareness of the effects of climate change and variability among government, private sector and civil society Greater integration of learning and knowledge into climate-resilient development	Coverage (comprehensiveness) of climate risk analysis and vulnerability assessments within the limits that current scientific evidence permits (project specific: sector, geographical area, gender, population group, location, etc.) Relevance and quality of knowledge assets created	
Investment I: **Climate Information System and PPCR Program**				
Component 1: National network of hydro-meteorological stations	National network re-established and expanded, operational and conforms with standards Information and data are centralized, shared and	Production of reliable data and information. Early warning systems functional in three areas identified as vulnerable to disasters.	Quantity and type of acquired equipment Number of stations in conformity with international norms	Degree of acceptance and ownership by targeted users

Component	Outputs	Outcomes	Indicators	Critical Conditions
	exploited	Information and data are used for planning and implementation of future programs and projects	Increase in number of hydro-meteorological stations Number of MOUs signed with entities for data access	
Component 2: Human and Institutional Capacity Building	Human and institutional capacities to develop, sustain and use a coherent integrated warning and decision-support system established	Increased capacity of practitioners to data leading to informed decision making Routine general and targeted delivery of weather forecasts to end users to clients.	Number of end-users using meteorological information and products Number of evacuation/rescue drills in select vulnerable locations after early warning systems are established. Number of weather forecasts published in national newspapers; aired on radio and television.	Stakeholders actively participate in training events to acquire technical skills and build cohesion National institutions and local government actively participate in planning and training events
Component 3: Program Management and Knowledge Sharing	Efficient program coordination and knowledge management mechanisms developed and utilized Integration and capacity-building support for gender sensitive approaches and awareness activities in overall PPCR implementation	IMCCC is regularly updated on SPCR implementation Relevant information concerning PPCR activities is shared at national and international levels Single entry point for PPCR program is provided Increased capacity of female practitioners	Number of information sharing activities on program initiatives Proportion of approved annual work plans implemented Number of capacity-building activities for gender sensitive approaches Proportion of approved annual work plans implemented	Different national stakeholders have appropriate technical capacities

Component	Outputs	Outcomes	Indicators	Critical Conditions
Investment II: **Improving the Climate Resilience of the Water Sector**				
GENERAL OBJECTIVE: Improve the capacity of central and local institutions in managing the water sector in light of increasing risk of climate change on already difficult situation of water scarcity in several vulnerable communities and economic activities	Systematic engagement in updating policy and institutional reform and financing development projects at local and central level Improve the policy framework and development planning responsive to climate change and strengthen resilience of water sector and related institutions to climate change	Increase the number of local water groups and institutions participating in actions designed to better manage the water sector.		Security and political stability in the country Government continues its engagement with national priority programs Government commitment to implement the NAPA Decree
Component 1: water information and data systems	Network of information centers in selected provinces and governorates covering the main weather zones in the country. Development of capacities of governorates in collecting and analyzing information and data related to climate-resilient water management decision in the selected governorates	Periodical reports on risk analysis and procedures to update warning system related to drought, floods, and mitigation of climate change Improve capacity of local institutions and participating agencies in collecting and updating weather information related to water and impact on economic activities. Increased capacity of local practitioners to generate localized, downscaled climate change models, and established linkages with the future climate information	Number of offices established Quality of reports produced Utilization of reports in shaping policies and regulations and actions. Public awareness of water resource management issues increases	Stakeholders are willing to participate in decisions concerning zoning and management plans Participation of local institutions in implementing the new information service.

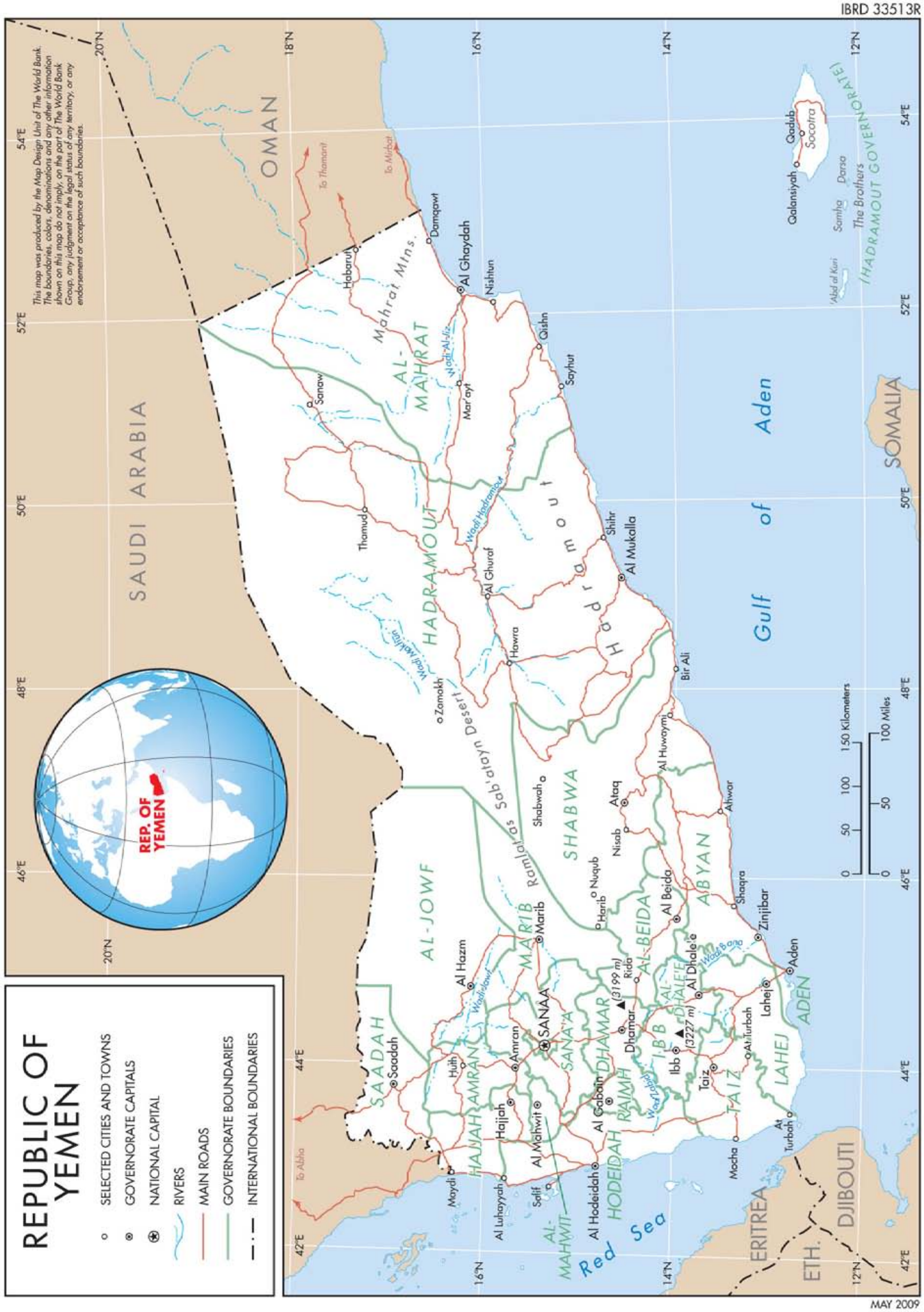
Component	Outputs	Outcomes	Indicators	Critical Conditions
Component 2: Enhance water policy and regulations	Capacity to conduct decentralized monitoring and enforcement has increased	Programs initiated under NWSSIP include climate resiliency measures in their design	Communities have effective system of incentives for sound IWRM Continuous public education becomes part of WUA and NWRA mandate	Local Security and willingness of water agencies to revise existing policies and regulations. Political risk of downgrading impact of climate change on policy formation
Component 3: Flood control and better management of water sheds	Improved water harvesting, reduce risks of floods, and protect assets and communities from flood, and collective participation among participating communities in watershed management	Improved water structure to manage floods and recharge ground water, improve water supplies to local communities, and reduce runoff and protect soil and crops, WUAs have increased their capacity and can conduct effective local monitoring and law enforcement Communities take primary responsibility for integrated management of their own water resources. Development practices become more climate resilient	Number of pilot flood control structure requested by participating communities Contribution of local communities to better management of floods and watersheds Number of famers who adopt modern irrigation technology Quality improvement in irrigation services and in increasing productivity among farmers in participating communities.	Weak community participation Lack of government support for devolving investment options to local communities Conflict between upstream and downstream communities on risk of flood control and use of water.

Component	Outputs	Outcomes	Indicators	Critical Conditions
		nationwide through better integration of climate resiliency measures in national planning Funding for common risk financing platform is stable and sustainable and continues to attract contributions from existing and new donors		
Component 4: increase the efficient use of reclaimed recycled water	Increase water availability to farmers Improve polices and regulations related to better utilization of waste water	Increased use of recycled water for agriculture and environmental services Improved technology for collection, treatment and application.	Volume of added water supplies for agriculture Increase participation of communities in collection and use	Environmental risks, cultural risks and social resistance and impact on prices and values of agricultural commodities grown under recycled wastewater.
Investment III: **Improving Rural Livelihood through Adaptation in Rain-fed Agriculture (IRLARA)**				
Component 1: Climate resilient soil and water conservation investments	Increase in the investments in soil and water conservation through integrated watershed management approach that takes into account climate considerations	Innovative soil and water conservation practices improve agricultural productivity and reduce the impact of climate risks	Number of Comprehensive Watershed Management Plans	National institutions and local government actively participate in planning and training events
Component 2: Improving livelihoods through productive rural investments	Alternative income generation projects based on climate resilient agriculture are being implemented by community groups	Innovative investment channels improve the livelihoods of local populations and reduce the impact of climate risks	Number of community sub-projects initiated	Villagers actively participate in training events to acquire technical skills and build cohesion

Component	Outputs	Outcomes	Indicators	Critical Conditions
Component 3: Integrated community risk management	A risk management scheme and social protection measures are in place for vulnerable households	The security of the most vulnerable groups is increased	% of households benefitting from the social protection measures Number of communities adopting community based early warning systems	Stakeholders at local and governorate levels understand the differentiated nature of vulnerability for different socio-economic groups
Component 4: Strategic Knowledge management and Project coordination	Efficient project coordination and knowledge management mechanisms are developed and utilized	Appropriate information concerning IRLARA activities is shared at national and international levels	Number of information sharing activities on project initiatives % of approved annual work plans implemented	Different national stakeholders have appropriate technical capacities
Investment IV: Climate-Resilient Integrated Coastal Zone Management				
GENERAL OBJECTIVE: enhance capacity and awareness of institutions and stakeholders on climate-resilient ICZM, at national and local levels in selected coastal governorates; and b) demonstrate benefits of implementing climate-resilient ICZM in three target sites	Training, awareness raising and local governance harmonization for climate-resilient ICZM	Strengthened institutional capacity to integrate climate-resilient ICZM into decision making at Shabwa, Hodeidah and Aden governorates Increased awareness to ICZM and climate change Increased capacity of local practitioners to generate localized, downscaled climate change models, and established linkages with the future National Climate Information System, leading to informed decision making and development planning for the coast		Security and political stability in the country Government continues its engagement with national priority programs Government commitment to implement the NAPA and National ICZM Decree

Component	Outputs	Outcomes	Indicators	Critical Conditions
		Demonstration of climate adaptation measures at the three target sites		
Component 1: Institutionalization and Capacity Building for Climate-Resilient ICZM	Development of capacities of governorates to integrate climate-resilient ICZM into decision making at the three governorates Dissemination of ICZM and climate adaptation knowledge as well as lessons learned from project implementation to local and national stakeholders	Strengthened institutional capacity to integrate climate-resilient ICZM into decision making at Shabwa, Hodeidah and Aden governorates Increased awareness to ICZM and climate change.	% of actions implemented as identified by the institutional framework action plan for each governorate Availability of zoning, management plans and construction codes for the three sites, integrating climate adaptation considerations Availability of a prioritized menu of best-practice options of alternative income sources, mechanisms for improved ecosystem services and climate-resilient infrastructure for the three target sites % of communication and awareness raising program implemented	Stakeholders are willing to participate in decisions concerning zoning and management plans Full implementation of the project's communication and awareness program
Component 2: Knowledge Management and Climate Change Modeling	Training of local practitioners on climate modeling	Increased capacity of local practitioners to generate localized, downscaled climate change models, and established institutional linkages, including with the future National Climate	Number of practitioners trained to undertake climate modeling	Identification of appropriate host, institutional linkages and independent funding

Component	Outputs	Outcomes	Indicators	Critical Conditions
		Information System, leading to informed decision making and development planning for the coast.		
Component 3: Demonstration of Climate-resilient ICZM	Implementation of adaptation measures at the three target sites according to a prioritized list	Demonstration of climate adaptation measures at the three target sites	Percent of identified alternative income sources implemented Percent of identified ecosystem services implemented Percent of identified climate-resilient infrastructure implemented	High standard implementation of agreed measures
Component 4: Project Management and M&E	Efficient and effective project management and M&E	Efficient and effective project management and M&E in accordance with the Grant Agreement, Project Implementation Manual, and annual work plans, and in compliance with fiduciary requirements	An effective M&E system is in place % of approved annual work plans implemented	Selection of qualified and experienced staff


IBRD 33513R
REPUBLIC OF YEMEN
SELECTED CITIES AND TOWNS
GOVERNORATE CAPITALS
NATIONAL CAPITAL
RIVERS
MAIN ROADS
GOVERNORATE BOUNDARIES
INTERNATIONAL BOUNDARIES
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REP. OF YEMEN
SAUDI ARABIA
OMAN
ERITREA
ETH.
DJIBOUTI
SOMALIA
Red Sea
Gulf of Aden
SAADAH
HAJJAH
AMRAN
AL-JOWF
MARIB
SANA'A
AL-MAHWIT
HODEIDAH
RAIMAH
DHAMAR
IBB
AL-BEIDA
AL-DHALE'E
TAIZ
LAHEJ
ADEN
ABYAN
SHABWA
HADRAMOUT
AL-MAHRAT
Hadramout
(HADRAMOUT GOVERNORATE)
Ramlat as Sab'atayn Desert
Mahrat Mtns.
SANAA
Saadah
Huth
Hajjah
Amran
Al Mahwit
Al Hazm
Marib
Al Hodeidah
Al Luhayyah
Maydi
Salif
Al Qabain
Dhamar
Rida
Ibb
Taiz
Mocha
At Turbah
Lahej
Aden
Al Dhale'e
Al Beida
Zinjibar
Shaqra
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Nuqub
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Ataq
Shabwah
Al Huwaymi
Bir Ali
Zamakh
Hawra
Al Ghuraf
Al Mukalla
Shihr
Thamud
Sanaw
Mar'ayt
Sayhut
Qishn
Nishtun
Al Ghaydah
Haburut
Damqawt
Qalansiyah
Qadub
Socotra
Darsa
Samha
The Brothers
'Abd al Kuri
Wadi Jawf
Wadi Hadramout
Wadi Masilah
Wadi Al-Jiz
Wadi Bana
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0 50 100 150 Kilometers
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12°N 14°N 16°N 18°N 20°N
MAY 2009

REPUBLIC OF YEMEN
Ministry of Water and Environment
Environment Protection Authority
No/Ref: EPA-322
Date: 16/10/2011
No.of Pages:

بسم الله الرحمن الرحيم

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الرقم / المرجع:
التاريخ:
عدد المرفقات:

Ms. Patricia A. Bliss-Guest
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The World Bank
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Email: cifadminunit@worldbank.org
Email: pblissguest@worldbank.org

Subject: Yemen Strategic Program for Climate Resilience (SPCR)

Dear Ms. Bliss-Guest,
Dear Members of the PPCR-Sub-Committee,

In my capacity as PPCR Focal Point it is my pleasure to submit herewith the Yemen Strategic Program for Climate Resilience to the Climate Investment Fund (CIF) Administrative Unit, for presentation at the upcoming meeting of the PPCR-Sub-Committee on November 2, 2011. This strategic framework program has been developed under Phase I of the Pilot Program for Climate Resilience (PPCR) and has resulted in the conceptual identification of priority interventions and investments to be supported under Phase II of the PPCR.

The preparation of the strategic framework document was guided by the Inter-Ministerial Committee on Climate Change and builds on a wide range of consultation processes, including meetings with relevant line institutions, stakeholder consultation workshops, and donor round tables.

I would like to use the opportunity to thank all the national stakeholders for all the support and input provided and for their unprecedented support to the development of this framework document despite the challenging working environment at the moment. All of which clearly demonstrate the strong commitment and ownership of the people of Yemen to this program.

I would also like to thank the donor community for all their technical feedback provided which helped us to further strengthen the framework document.

Allow me to thank the colleagues from the World Bank who went out of their way to help us with technical guidance during these challenging times.

We very much look forward to moving ahead with the preparation of the identified priority investments once the situation in the country is conducive for project execution, implementation support and oversight.

Sincerely yours,

Mahmoud M. Shidiwah

Chairman
Environment Protection Authority
PPCR Focal Point

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REPUBLIC OF YEMEN

Ministry Of Planning &
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مكتب : ....

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Date : ....

الرقم: ٣ / ١١ / ٢٠١١م (١)

التاريخ: ٣ / ١٠ / ٢٠١١م

Ms. Patricia A. Bliss-Guest
Program Manager
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(Transmission by fax: 001-202-522-2937)
Email: cifadminunit@worldbank.org))

Dear Ms. Bliss-Guest,

Subject: Yemen Strategic Program for Climate Resilience (SPCR)

The Ministry of Planning and International Cooperation, on behalf of the Government of the Republic of Yemen would like to formally submit the document of the Strategic Program for Climate Resilience (SPCR) to the Climate Investment Fund (CIF) Administrative Unit, and to be presented in the upcoming meeting of the PPCR Sub-Committee which going to be held during the period from end of October to beginning of November 2011 . This strategic program document was developed under Phase I of the Pilot Program for Climate Resilience (PPCR) to identify priority interventions and investments to be supported under Phase II of the PPCR.

The strategic program document is an outcome of a collective consultative processes that were initiated and commenced in conjunction with the World Bank missions on PPCR phase I during 2010, and continued after the start up of phase I of PPCR January 2011. These consultations involved different relevant stakeholders including representatives of Water Users Associations, academia, NGOs, agriculture and fisheries cooperatives, women associations, donor community, government institutions and line Ministries represented in the High Level Inter Ministerial Committee for Climate Change (IMCCC).

We look forward to the approval of the PPCR Sub-Committee in its coming meeting, preparation of phase II documents to be signed and to the start up of implementation of this important program as soon as we resume implementation of other portfolio with the World Bank.

Sincerely yours,

Dr. Mutahar A. Al-Abbasi

Vice Minister of Planning and International Cooperation