Appendix A

REQUEST FOR PROJECT/PROGRAMME FUNDING FROM ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to

The Adaptation Fund Board Secretariat
Email: secretariat@adaptation-fund.org

ADAPTATION FUND

DATE OF RECEIPT:
ADAPTATION FUND
PROJECT/PROGRAMME ID:
(For Adaptation Fund Board Secretariat Use Only)

PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY: **REGULAR PROJECT/PROGRAMME**

COUNTRY/IES: **Jordan**

SECTOR/S: **Agriculture & Water**

TITLE OF PROJECT/PROGRAMME: "**Increasing the resilience of poor and vulnerable communities to climate change impacts in Jordan through Implementing Innovative projects in water and agriculture in support of adaptation to climate change".**

TYPE OF IMPLEMENTING ENTITY: Government Entity (Ministry)

IMPLEMENTING ENTITY: **Ministry of Planning and International Cooperation (MOPIC)**

EXECUTING ENTITY/IES:
Jordan Valley Authority (JVA) /Ministry of Water and Irrigation (MWI)
Jordan Hashemite Fund for Development of Jordan Badia (HFDB)
National Center for Agricultural Research & Extension (NCARE)
Ministry of Environment (MOE)
Ministry of Agriculture (MOA)

AMOUNT OF FINANCING REQUESTED: **(U.S Dollars 9,226,000)**

PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

Provide brief information on the problem the proposed project/programme is aiming to solve. Outline relevant climate change scenarios according to best available scientific information. Outline the economic social, development and environmental context in which the project/programme would operate.

Brief information on the problem the proposed project/programme is aiming to solve

Jordan is one of the ten driest countries in the world with demand exceeding available water resources. Access to a safe water supply is an essential requirement for all sectors; however, some sectors have excessive claims on the available water resources. Jordan, with a total area of about 88 780 km², lies to the east of the Jordan River and is divided into twelve administrative governorates: Amman, Zarqa, Irbid, Mafraq, Ajloun, Balqa, Madaba, Karak, Tafileh, Ma'an and Aqaba. It is bordered to the north by the Syrian Arab Republic, to the northeast by Iraq, to the southeast and south by Saudi Arabia, to the far southwest by the Gulf of Aqaba (northern shore of the Red Sea) and to the west by Israel and the West Bank.

The country can be divided into four physiographic regions:

- The Jordan Rift Valley (JRV) along the western border of the country, with a total area of around 5 000 km2, starts at Lake Tiberias in the north (212 m below sea level) and continues south through the Jordan Valley into the Dead Sea on the Israeli–Jordanian border (417 m below sea level). From the Dead Sea southwards, the Rift is occupied by the Wadi Araba, then the Gulf of Aqaba, and then the Red Sea.

- The Highlands to the east of JRV, with a total area of around 5 000 km², run from north to south. They consist of ranges of mountains and plains at an altitude between 600 and 1 600 m above sea level and numerous side wadis sloping towards the JRV.

- The plains, with a total area of around 10 000 km², extend from north to south along the western borders of the Al-Badiah desert region.

- Al-Badia desert region in the east, with a total area of around 69 000 km², is an extension of the Arabian Desert.

Figure (1): Jordan Geographical Map

The land suitable for cultivation is around 886 400 ha, or around 10 percent of the total area of the country. In 2005, the total cultivated area was estimated at 270 000 ha, of which 184 000 ha consisted of annual crops and 86 000 ha of permanent crops. However, occasionally half of the rain fed land is left fallow in a year due to fluctuating and unevenly distributed annual rainfall. For instance, the harvested annual crops area was 168 435 ha in 2003 and 76 266 ha in 2004. Moreover, it is estimated that between 1975 and 2000 around 88 400 ha of good rain fed land was lost due to urban expansion. Data for the last three decades show an increase in irrigated land and in land planted with permanent crops, mainly in rain fed land of the Highlands (DIC, 2004; MOA, 2005; DPI, 2005).

The climate of Jordan is semitropical in the JRV, Mediterranean in the Highlands and with continental influence in the eastern desert and plains region. Winter is the rainy season and is warm in the JRV, moderate to cool in the Highlands and extremely cold and dry in the desert land, whereas the summer is hot in the JRV, moderate in the Highlands and hot in the plains and the desert.

Groundwater abstraction takes place at twice its recharge rate. As of 2007, there are hundreds of illegal wells resulting in a deficit of 151 MCM. Annual per capita water availability has declined from 3,600 m3/year in 1946 to 145 m3/year today.

The population is expected to grow from about 5.87 million in 2008 to over 7.80 million by the year 2022 with a projected water demand of about 1,673 MCM in the same year. Irrigation water demand was 71% in 2007 with a 64% supply. Capping irrigation demand is necessary to satisfy municipal, industrial and tourism water demands. (Jordan Water Strategy -Water for All 2008-2022)

Jordan water is derived from surface and underground sources. Developed surface water in Jordan is estimated at 295 MCM in 2007 at approximately 37 percent of Jordan's total water supply. The contribution of the groundwater is estimated at 54 percent of the water supply. Other water sources include treated wastewater which is used for irrigation in addition to desalinated water from some springs (Royal Commission on Water 2009).

Rainfall varies considerably with location, mainly due to the country's topography. It usually occurs between October and May. Annual rainfall ranges between 50 mm in the eastern and southern desert regions to 650 mm in the northern Highlands. Over 91 percent of the country receives less than 200 mm of rainfall per year. On average, Jordan receives about 8,500 million cubic meters (MCM) of rainfall per year. Over 90% of this water evaporates leaving 505 MCM that is used as surface water and another 275 MCM that recharges ground water aquifers. Reuse of treated wastewater provides about 70 MCM per year.

The largest source of external surface water is the Yarmouk River, which enters from the Syrian Arab Republic after first forming the border with it. It then joins the Jordan River coming from Israel, taking its name. The natural annual flow of the Yarmouk River is estimated at about 400 million m3, of which about 100 million m3 are withdrawn by Israel. However, the total actual flow is much lower at present as a result of the drought and the upstream Syrian development works of the 1980s. The Yarmouk River is the main source of water for the King Abdullah Canal (KAC) and is thus considered to be the backbone of development in the Jordan Valley. A main tributary of the Jordan River, controlled by the King Talal Dam and also feeding the KAC, is the Zarqa River. Jordan's surface water flow is supplemented by smaller rivers known as side wadis. Most of these side wadis originate in the Jordanian highlands and flow westward, toward the Jordan Valley. There are nine perennial side wadis that contribute to the catchment. This has been heavily requested by the Southern Jordan Valley farmers in Ghor fifa and, Mazra' and Hadeetha***. (Adaptation to climate Change in the Jordan Valley)***

The limited fresh water resources in Jordan are used in different sectors as domestic, tourist sector, industry, public parks and agriculture. Increasing demand in domestic water use, tourism and intensification in agriculture requires more water in the future. Agriculture consumes about 65% of the available water resources while 30% is for domestic use and tourist sector. Industry consumes about 5% of the available water resources. In order to protect the groundwater aquifers, new water resources must be explored that will support augment and strengthen national development, as well as increase its self-reliance and at the same time avoid dependence on outside sources

Outline of relevant climate change scenarios according to best available scientific information

Climate Change Scenarios

Because of the huge imbalance in the population-water resources equation, the treated wastewater effluent is added to the water stock for use in irrigated agriculture. It will constitute a substantial percentage of the irrigation water in future years. The National

Environmental and Economic Development Study (NEEDS) for Climate Change report (JUST 2010) stated that Jordan is a vulnerable country in terms of climate change impact. Climate change is expected to affect the quantity and quality of the country's water resources, it will also result in reduced agricultural productivity due to more erratic rainfall patterns, reduced freshwater resources and increased temperatures. Only 4% of the country's total area receives more than 300mm/year of rain (the highlands). That's why Jordan is ranked among the ten driest countries in the world as on the basis of per capita water availability, the annual per capita water availability has declined from 3,600 m3 in 1946 to 145 m3 today. Demand for water exceeds Jordan's available water resources. The population was expected to grow from about 5.87 million in 2008 to over 7.80 million by the year 2022 with an average annual population growth of 2.9% , this in addition to the large influxes of refugees (Iraqis and Syrians in the last couple of years) have also contributed to a tripling of municipal wastewater generation that is available for reuse.

As a result severe natural (driven by climate change and forced by the influx of refugees coupled with natural population growth) water shortages have forced the government to impose a rationing program, whereby domestic water supply is pumped only twice a week during summer months, consequently many people have limited access and intermittent supply of clean water and are not connected to the public network specially the remote poor communities in Jordan Valley and the Highlands.

In the SNC (2009), the climate baselines were constructed to cover the period 1961-2005. The purpose of selecting a baseline scenario that covers the last 45 years of the climatological record in the study area was to construct a projection of climate change scenarios for the next 45 year period, 2005-2050.

Previous national studies investigating the weather records showed an increase in the magnitude and frequency of extreme temperatures. Higher temperature and lower precipitation are expected as a result of climate change. (Jordan Second National Communication on Climate Change to the UNFCC, 2009 (SNC)).

The main results of the local climate change studies are:

- **Temperature:** warming trends in annual maximum temperature with accompaniment of the statistically significant warming trends in the annual minimum temperature result in a decrease in the diurnal temperature range in the majority of the stations.
- **Precipitation:** decreasing trends in the annual precipitation are apparent evidence to climate change in Jordan.
- **Relative humidity:** significantly increasing trends in relative humidity mainly started to occur at the end of the decade 1970s. The yearly total of evaporation shows significant decreasing trends in all the locations, which started to occur in the 1960's and 1970's.
- **Sunshine duration:** most of the stations experienced significant decreasing trends of sunshine duration. The decrease in sunshine hours ranged between 2 and 8% and started in the decades of the 1960s and 1970s.

Economic Status

Agriculture accounted for 3 percent of GDP, compared with 6 percent in 1992. The total population economically active in agriculture is estimated at 194 000 inhabitants, amounting to 9.8 percent of the economically active population in 2005, of which 70 percent is female and 30 percent is male. In JRV around 350 000 people are the main beneficiaries of irrigated agriculture and women form an important component of the labour force.

The Hashemite Kingdom of Jordan has been facing a chronic imbalance in the water resources equation and according to the national water strategy, irrigated agriculture covered around 33 percent of the cultivated area in 2010.

Permanent crops represent 56 percent of harvested irrigated area and 78 percent of the harvested rainfed area. They consist of citrus, bananas, olives and vineyards. The main annual crops are vegetables, potatoes and cereals (wheat and barley). Besides the climate (drought, fluctuating rainfall and hot winds) the main difficulties for rainfed agriculture are the fragmentation of farm holdings and the erosion of top soils in the

steep slopes, while the constraints for irrigated agriculture are the limited available water resources, overexploitation of groundwater, wastewater used in irrigation, silting of dams, and agricultural production marketing problems.

In spite of the low contribution of agriculture to GDP, both rain fed and irrigated agriculture are vital socioeconomic activities in the country. They are the source of fresh vegetables all year round, they play an important role in the national economy and they provide demographic stability in the rural communities and in the JRV region.

In general, the agricultural sector is subjected to strong competition from other sectors and receives few national or international investments in comparison with other economic activities.

On a socio-economic level, budgetary outlays for water shortage and health will need to increase. Costs of doing business will rise, affecting the competitiveness of Jordan's economy. The poor and lower classes are the first to feel the impact of water shortages and poor water quality. These impacts are already being felt today and expected to worsen in the coming years. Jordan is in need for capacity development at systemic and institutional levels for establishing and operating economic tools and incentives for various stakeholders in climate change dimensions. ***(Jordan Valley Authority JVA)***

Water is a primary commodity which directly impacts small farmers competitiveness and agribusiness processors throughout the country and which has a significant effect in the country's ability to realize sustainable and socially-shared economic growth. Furthermore, water is closely linked to food, energy and urban development. Yet, the collision of massive economic and demographic pressures with climate and environmental forces is leading to a crisis like none before. The declining water supply in the country is in great part due to a lack of a clear and efficient regulatory system for water and lack of coordination on foundational factors for competitiveness of the agribusiness sector. Current arrangements to provide water to farmers are unsustainable because they are jockeyed with governance issues. Petty corruption, weak or biased

enforcement of illegal practices, unclear incentives systems, undependable service delivery, thorny policy making, lack of funding for innovations and mismanagement of resources are some of the issues which thrive in the absence of a market-based commercial mechanism and market control for water.

Jordan is in a strong position to leverage its competitive advantages in agriculture, a strategic sector which contributed to 4.4% of GDP in 2011, while accounting for 15.3% of export earnings. Jordan banks on a favorable climate, a geographical location at the heart of the Middle East with access to Europe, a skilled agricultural workforce, and good trading relations with a number of countries. The agricultural sector is not only the major source of food items especially fruits and vegetables but also an important source of hard currencies originated from exports.

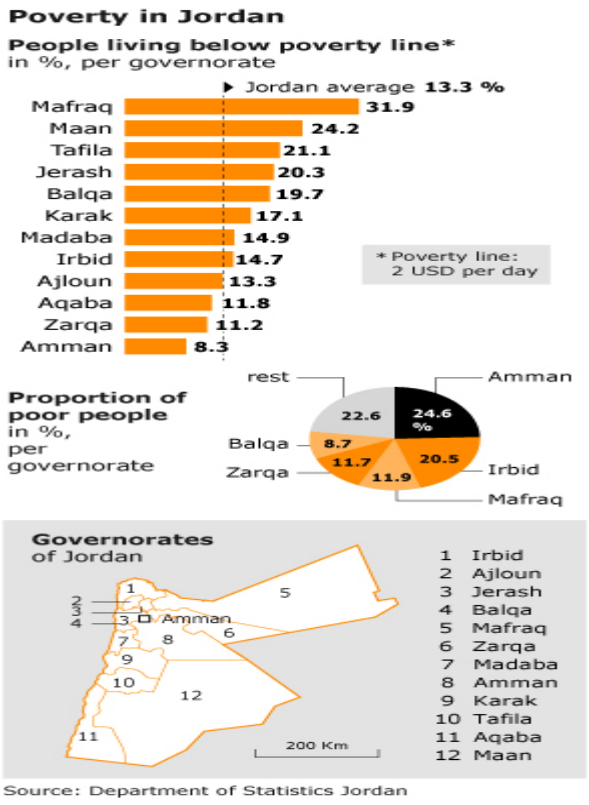


Figure (2): Poverty in Jordan

Reference (http://fanack.com/countries/jordan/economy/regional-development/)

Jordan is facing challenges in terms of economic inclusion, growth, competitiveness, and job creation. These challenges, similar to other transition countries in the Middle East and North Africa (MENA) region, were made even more salient as the Arab Spring unfolded across the region. Job creation and economic inclusion are key priorities for Jordan today—these goals will be advanced by enhancing sectoral competitiveness, and fostering sustainable, private-sector led growth.

In a fragile context, with high social and environmental stakes, the government's ideas to impose new crop patterns or top-down solutions that do not fit business needs are likely to clash with the realities and ideas of communities who are suffering from existing weak water governance. In the tense Arab Spring climate, appropriate solutions to water conservation, distribution and even commercialization could only be envisaged without the risk of social flare-up if a multi-stakeholder approach is applied. Such an approach needs to focus on the inclusion of the relevant stakeholders in the policy-making process, in order for those stakeholders to collaborate to enhance the environment for agribusiness competitiveness, fairness in the distribution of water, and accountability through the establishment of clear actions on regulation, skills, financing, innovation, and infrastructure. (**THE COMPETITIVE INDUSTRIES & INNOVATION PROGRAM)**

Environmental Status:

The production of food in semi-arid countries like Jordan is hardly possible without irrigation. The irrigated areas are located in the Jordan Valley (some 33,000 hectares), and in the Plateau (some 44,100 hectares). Irrigation in the Highlands is not controlled and efficiency is poor. More development has taken place on the Highlands using groundwater sources where the private sector was behind most of that development, with the exception of small and scattered irrigation projects supervised by government agencies in the 1960s. About 8,000 more hectares of arable land remains to be irrigated north of the Dead Sea, and some 2,000 hectares south of the Dead Sea. Some 400,000 hectares are fit for dry land farming, but it is practiced on half of this potential area because of the insecurity associated with erratic rainfall and other reasons. Irrigated agriculture, however, provides most of the agricultural production in the Kingdom and offers the higher percentage of agricultural and other jobs in support services.

Wastewater Reuse

The Ministry of Water and Irrigation (MWI) adopted a Water Strategy 2008-2022 that aims to increase the volume of recycled wastewater more than fourfold to 256 MCM/year by 2022.

Climate change induced impacts include (drought, fluctuating rainfall and hot winds) and amongst the main difficulties facing irrigated agriculture in the valley causing constraints for irrigated agriculture are the limited available water resources, overexploitation of groundwater, wastewater used in irrigation, silting of dams, the fragmentation of farm holdings and agricultural production marketing problems. There is a lack of sewage water networks in towns and villages in the JRV and other irrigated areas. Houses depend on septic tanks to handle sewage water.

Much of Amman's wastewater treated effluent is discharged in the Zarqa River and is impounded by the King Talal Dam, where it is blended with fresh floodwater and subsequently released for irrigation use in the Jordan Valley. Irrigated agriculture covers around 33 percent of the cultivated area. Permanent crops represent 56 percent of harvested irrigated area and 78 percent of the harvested rain fed area. They consist of citrus, bananas, olives and vineyards.

Over the last three decades sewage water networks have been constructed in cities and towns to serve around 70 percent of the population in Jordan. Twenty-three wastewater treatment plants are in operation and the treated wastewater is used in irrigation. Jordan's current agricultural marketing practices and agricultural exports have fluctuated over the past decades. Despite tremendous government and private sector efforts in the last decade to develop new markets, the Arab countries remain Jordan's major agricultural export market. Arab countries account for 98.9 percent of total vegetable exports. The balance was exported to the West and Eastern Europe.

A survey of the existing status of the 23 Wastewater Treatment Plants in Jordan to assess their removal efficiencies and the potential for reuse of the treated wastewater showed that the crops being grown with reclaimed water include fodder, cereals, and tree crops. None of the fruits or vegetables grown in Jordan for the fresh market are directly irrigated with reclaimed water. However, effluent produced at As-Samra WWTP flows into King Talal Reservoir, where it is mixed with surface water. The blended water is used for the irrigation of crops in two zones accounting for 26 percent of the exports from the Jordan Valley.

The primary market opportunity identified for crops irrigated with reclaimed water is to meet the fodder requirements of milk cows, sheep, and goats. The national demand to meet the fodder requirements of milk cows alone is 830,000 tons annually.. The huge gap is filled by importing dry hay or by substitution with other kinds of feed, such as barley. The demand for fodder is expected to increase in the future to meet the growth in Jordan's needs for dairy products.

The key element in the strategy for climate change adaptation through wastewater reuse and marketing crops grown with reclaimed water is through a public awareness and education program linked to the water reuse demonstration projects. The information developed by the demonstration projects, as well as experience gained in other countries in terms of using reclaimed water to adapat to climate change and increasing demand for water supplies for irrigation, provide compelling evidence of the safety of consuming the crops and animal products being produced by direct irrigation with reclaimed water. Efforts are needed to organize public awareness campaigns at different levels, starting with farmers, to overcome the negative image of using reclaimed water for irrigation.

With More than 90 percent of sewage water of the Greater Municipality of Amman is treated and then released into the Zarqa River. The mixed water is then stored in the King Talal Dam reservoir to be used in irrigation in the middle Jordan Valley irrigation schemes (this involves 78 percent of the treated wastewater). Treated wastewater from the other plants is used around the plants and/or mixed with surface water to irrigate areas in the Side Wadis, it is worthy to mention that some of these plants have been

overloaded and are not able to meet the standards specified by the government. If this continues to be carried out in an uncontrolled manner, there is a clear risk associated with using reclaimed water to irrigate crops especially for those crops eaten raw. Few farmers will admit to such practices, arguing that these crops were irrigated by spring water and shallow groundwater. International and local studies show that the increasing use of treated wastewater in agriculture.

PROJECT / PROGRAMME OBJECTIVES:

List the main objectives of the project/programme.

Overall Objective:

Adapt the agricultural sector in Jordan to climate change induced water shortages and stresses on food security through piloting innovative technology transfer, policy support linked to community livelihoods & resilience.

Component 1: Climate change adaptation of Agricultural & water Sector through Technology Transfer (*The use of Non-conventional water resources (Reuse of wastewater, rainwater harvesting & perma-culture).*

Objectives:

- Providing a unique, efficient, simple and cost effective system to people in arid regions who suffer from water scarcity, and food insecurity.
- Deployment of advanced innovative irrigation methods such as drip, spray and micro-sprinkler irrigation.
- To Increase adaptation to climate change through providing a unique, efficient, simple and cost effective systems to people in arid regions who suffer from water scarcity.
- Limit the impact of climate change on water supplies of Jordan by reusing trated

wastewater and rainwater harvesting and thereby reducing the consumption of the scarce ground water.

- To implement a holistic approach for integrated water management in remote arid regions.
- Releasing fresh water sources for potable water supplies and other priority uses and replacing it with treated wastewater for irrigation purposes.
- Assessing the vulnerability of ecosystems and planning food security and humanitarian programs
- Enhance water distribution services and increase irrigation network efficiency.
- To Implement Low-cost, low-technology yet sustainable and practical water reuse program for rural community livelihoods.

Component 2: Capacity Building at both the national and local/community levels respectively, knowledge Dissemination, policy and legislation mainstreaming.

Objectives:

- Strengthened ability of remote poor communities to make informed decisions about climate change-driven hazards affecting their specific locations
- Involve and educate the engaged local community in all the phases of the project.
- Reduce the health risks associated with irrigation practices.
- To motivate the targeted communities to work, cooperate and support each other.
- Reinforce the concept of participatory water & agriculture development and management approach that involves users, planners and policy makers at all levels.
- Enhance the quality of life and food security in arid regions and contribute to climate change adaptation.
- Developing a competitive, inclusive and sustainable agribusiness industry.

PROJECT / PROGRAMME COMPONENTS AND FINANCING:

Fill in the table presenting the relationships among project/programme components, activities, expected concrete outputs, and the corresponding budgets. If necessary, please refer to the attached instructions for a detailed description of each term.

For the case of a programme, individual components are likely to refer to specific sub-sets of stakeholders, regions and/or sectors that can be addressed through a set of well defined interventions / projects.

	PROJECT/PROGRAMME COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	AMOUNT (US$)
1.	**Component 1:** Climate change adaptation of Agricultural & water Sector through Technology Transfer (The use of Non-conventional water resources (Reuse of treated wastewater, rainwater harvesting & Permaculture)	- Quantity (m3) of Supplementary water available for agriculture as a result of wastewater reuse & rainwater harvesting in wadi Musa & Northern Jordan Valley. - Number of farms/hectares using the water supply for supplementary irrigation - Amount of Vegetable produced in (Kg / Year)	- Increased water availability and efficient use through wastewater reuse & water Harvesting technologies - Enhanced service delivery from government ministries, academic institutions to citizens on climate Change	**5,900,000** **For Projects Under Component "1"** (1.1) Reuse of Treated Wastewater In Wadi Mousa US$ 2.1 M, (1.2) The Northern Jordan Valley Wastewater Reuse Project US$1.7 M, (1.3) Rain water harvesting technologies in poverty pockets: US$ 1.1 M, (1.4) Building Resilient Food Security Systems through Permaculture projects US$ 1 M,
2.	- Component 2: Capacity Building at both the national and local/community levels respectively, knowledge Dissemination, policy and legislation mainstreaming.	- Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses - Number of communities covered by improved warning system and weather information - - Number of laws & regulations amended - in support of climate change adaptation	- The generation and dissemination of knowledge for how to enhance the water/ Agricultural sectors capacity to adapt to climate change - Mainstreaming new policies and legislations which incorporate Climate change adaptation measures into local and national strategies & plans. - Reduced exposure at national level to climate-related hazards and threats - - value-add for agribusiness by producing exports further along the value chain,	- 1,900,000 -For projects under Component "2" : -(2.1) Support for the National Policy Capacity Building Needs for Climate Change Adaptation of Jordan's Agriculture Sector US$ 500,000, -(2.2) [Using ICT as an enabling tool for more effective climate change adaptation and development programmes US$ 800,000 -(2.3) Jordan Valley Water Sustainability and Agribusiness Competitiveness US$ 600,000
6	**Project/Programme Execution cost**			**703,000**

.	
7. Total Project/Programme Cost	**8,503,000**
8 . **Project/programme Cycle Management Fee charged by the Implementing Entity (if applicable) (8.5%)**	**723,000**
Amount of Financing Requested	**9,226,000**

PROJECTED CALENDAR:

Indicate the dates of the following milestones for the proposed project/programme

MILESTONES	EXPECTED DATES
Start of Project/Programme Implementation	January 2014
Mid-term Review (if planned)	February 2016
Project/Programme Closing	January 2018
Terminal Evaluation	April 2018

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

Component 1: Climate change adaptation of Agricultural & Water Sector through Technology Transfer (*The use of Non-conventional water resources (Reuse of treated wastewater & rainwater harvesting & Permaculture)*

Background: As pressures continue to stress fresh water resources, resource managers are more and more frequently turning to secondary quality supplies (seawater, brackish water, treated wastewater) to meet non-potable demands especially in water scarce regions such as the Middle East.

Climate change will exacerbate current aridity and conditions of water shortage. This will directly impact food security, where around 67% of all water withdrawals are for agriculture. Introducing affordable technologies will definitely assist the agriculture sector in reducing water losses which may also benefit from technologies that recycle, harvest and conserve water, thus reliving the saved water for industrial and municipal consumers. Farmers should be encouraged to plant higher-value (cash crops) crops and adopt simple changes in operation and maintenance of on-farm irrigation systems to reduce water consumption.

Wastewater reuse as a climate change adaptation tool in the water and agriculture sectors

Project (1) *Reuse of Treated Wastewater for On-Farm Agricultural Adaptation and as a tool for Integrated Water Resources Management- at Wadi Mousa*

Wastewater reuse is becoming more popular throughout the world, particularly in arid and semi-arid regions. It is also considered one of the main climate change adaptation actions mentioned in Jordan water strategy (2008-2022). Employing reclaimed water to irrigate crops is also considered as one of the efficient methods towards freeing up the freshwater supplies for human consumption. The rationale behind this project, is to encourage and assist governmental and non governmental agencies and NGOs to implement where feasible direct use of treated effluents from wastewater treatment plants and to demonstrate to decision makers and the public at large that water reuse is an effective climate change adaptation option, that is reliable, commercially viable, environmentally sustainable and safe where this resource is considered as a viable resource if applied under nationally and internationally approved controls

for managing Jordan's water extremely scarce and stressed water resources.

Fueling the use of reclaimed water is the advancement of wastewater treatment technologies that can provide good quality water at a reasonable cost (when compared with the value of freshwater). Two locations are being proposed as pilots for wastewater reuse, one in southern Jordan at Wadi Mousa-Petra Region and the other one at Northern Jordan Valley where farming pattern is mainly citrus and vegetables.

According to the National Strategy, by the year 2020, it is expected that the volume of treated wastewater will reach 220 MCM and will become a significant resource for satisfying the total irrigation demand and assist in agricultural and water sectors adaptation to climate change.

Potential Beneficiaries of Reclaimed Water Reuse in Wadi Mousa

Community consultation: On 9th of July 2012 MOPIC held a consultation meeting with Al-Ssad Al-Ahmar Association (a Community Based Cooperative Association) through the Enhanced Productivity Program (EPP) recognized the need to launch a new initiative – Small Grants for Direct Interventions which was meant to provide funding for community based organizations (CBO) to start and run income generating projects. One of the pilot organizations benefiting from the seed funds provided by MOPIC was Al-Assad Al-Ahmar Association, located in Wadi Mousa region. This association requested funds to implement agricultural related project activities relevant to harvesting forages. The project has been implemented with successful activities that enhance the productivity, create new job opportunities and improve the living standards of beneficiaries and utilized wastewater reuse as a water resource for irrigation and adaptation to climate change impacts.

The above consultation meeting was aimed to reach an agreement on a pilot project relevant to Wastewater reuse as a climate change adaptation tool in the water and agriculture sectors. The participants representing a wide spectrum of the community ranging from farmers, females, heads of households, and NGOs, discussed the project concept and recognized the importance of using treated waste water as a climate change adaptation in agriculture in Wadi Mousa region. (Attached: Al Ssad Al Ahmar Community consultation sign up sheet and community needs).

The justification for the added value of implementing another pilot project in Wadi Mousa following the pilot previously funded by USAID, for which lessons have been drawn and for which that pilot was successful, The cultivated forage crops in Wadi Mousa are normally irrigated with both rain and fresh water from wells, however and due to climate change negative impacts there is not enough rainfall thus putting an added stress on the ground water supplies where supplemental irrigation with reclaimed water is becoming more of a necessity and a climate change adaptation method. It is therefore possible that with the increasing demand on fresh water supplies then tapping into the

wastewater as a reliable and constant source of water coupled with the need to exchange the old irrigation system to meet the growing irrigation water demand and to release the fresh water supplies for municipal potable water needs could become economically feasible.

Also for purposes of the economic and financial analysis of the results of the Wadi Musa Demonstration Project, originally established by USAID (1069 dunums), it was decided that the experience gained on irrigation with reclaimed water using special irrigators in the reuse pilot area has had positive impacts on the direct beneficiaries of the project (the local community) and that it has managed to win the acceptance by the local community as well as receive an IWA international award in 2008 as a supplemental source of irrigation thus there is a need for scaling up that experience to cover an estimated 2,500 dunums in total (where USAID initiated 1069 dunmums irrigated with reclaimed water) with the remaining 1331 dunmum which are currently irrigated with fresh water in Wadi Mousa. So what is being proposed under this pilot is not similar activities but a continuation of support for on-going activities at the 1069 dunums and expansion of the area to be irrigated area in Wadi Mousa as there are more wastewater that is available from the wastewater treatment plant that is in excess of the current 1069 pilot needs and link both pilots to other income generation activities as detailed below to demonstrate the environmental and socio-economic benefits of reclaimed water and its use as a climate change adaptation mechanism.

According to the National Water Strategy, it is stipulated that by the year 2020, the volume of treated wastewater is expected to reach 220 MCM representing a more significant amount in the national water agenda and thus will become a significant resource for satisfying the total irrigation demand warranting more technical assistance and preparation of remote local communities to using this valuable resource more wisely, safely through compliance with national standard 893/2006 and ultimately assist in the agricultural and water sectors adaptation to climate change (Jordan National Climate Change Policy of the Hashemite Kingdom of Jordan for 2013-2020).

The beneficiaries of reclaimed water reuse in Wadi Mousa are not necessarily limited to those receiving the water. For example, if irrigation water users can be induced to exchange reclaimed water for their current potable water supply, the potable water becomes available to meet other needs. The customers served with potable water made available by the exchange become the primary beneficiaries and a source of revenues to pay for the reclaimed water project. These types of exchanges can be an economically and financially feasible element of a water reuse program, even if a preferential price is necessary to induce the irrigators to use the reclaimed water.

For purposes of the economic and financial analyses of the Wadi Musa Demonstration Project, it was assumed that the reclaimed water irrigators in the reuse area are the direct beneficiaries of the project. However, since there are an estimated 2,500 dunums irrigated with fresh water in Wadi Musa, it is possible that at some future date a reclaimed water exchange with these irrigators to meet growing municipal potable water needs could become economically feasible.

Attachments: Participants of the meeting - Members of Al-Assad Al-Ahmar Association.

Figure (1.1.1) : Proposed location for the Wadi Mousa Reuse Project

Figure (1.1.2): Wadi Mousa Location inside Petra Regional Authority Governorate

Indirect beneficiaries of water reuse for irrigation are created from the projects outputs and inputs. In addition to the direct income and jobs created by construction, operation & maintenance, and farming operations, secondary earnings and employment are generated in businesses that use or process the project outputs (e.g., crops) and businesses that supply inputs (e.g., farm supplies). This “multiplier effect” is felt primarily in the local or regional economy, but there are indirect benefits at the national level as well. For example, project outputs can result in an increase in exports or offset imports, thus improving the balance of payments. Further consideration is given to economic and social impacts in the section below on the “Socioeconomic Assessment of Reusing Water at Pilot Demonstration Sites”.

In addition to the direct use of reclaimed water to irrigate crops, there are other potential beneficial uses, primarily adaptation to climate change, enhanced community resilience to face water shortages, irrigation with reclaimed water for non conventional uses such as golf course irrigation, recharge of an aquifer used as an irrigation water source, industrial use, environmental enhancement, and public amenity area irrigation. These other potential uses should be identified and evaluated in formulating water reuse plans for new or expanded reclamation projects, using multi-purpose planning techniques. Reference: Marketing and Economic Implications of Irrigation with Reclaimed Water in Jordan. (**Technical Report by PA Consulting Group, Jordan Wastewater Reuse Implementation Program, USAID).**

Project Background & Major activities

The Kingdom of Jordan has made significant strides toward integrating reclaimed water resources in their national water planning. The aim of this project is to build on the USAID funded project "Reuse for Industry Agriculture

and Landscaping-RIAL" success and experience working toward optimal on-farm integrated agriculture providing economic benefit and supporting community development. The proposed project represents a third phase of investment in reuse implementation and a first in on-farm integrated agriculture in Jordan.

1. Wastewater Reuse for Fodder Irrigation:

Forty farmer plots were established, needing a fully operational irrigation system to be directly linked to a wastewater treatment plant that is capable of utilizing all of the available effluent in peak months. This is a major step, providing a complete win-win situation: The number of farmers making use of treated effluent (and reducing direct disposal into the environment) are more than before. Using treated wastewater around Jordan has shown that Yields on farmers' fields would increase, as does water productivity. The proposed wastewater reuse project in Wadi Mousa will provide an excellent example of how to link and integrate wastewater treatment with productive agriculture for the achievement of climate change adaptation in both agriculture and water sectors can be replicated in other parts of Jordan and the region.

The proposed cropping pattern will consist of about 150 dunums of alfalfa, ranging from 3 to 4.5 dunums per farm, 163.7 dunums of fruit trees, 248.7 dunums winter fodder crops, and 5.0 dunums of landscaping, native trees, and windbreaks. All farms will have established alfalfa and winter fodder crops and will be reporting yields. It is possible to obtain a yield in the order of 160 tons/hectare of fresh cut alfalfa with good management.

A critical aspect for the success of the drip irrigation performance will be the uniformity of water delivery along each lateral. Uneven distribution of water will result in either over-irrigation or under-irrigation of a particular plant, and this will impact negatively on production and water use efficiency. Optimal productions needs to maintain uniformity at its acceptable level (> 75%) by replacing obsolete drip GR lines (useful life 5 years) and maximize alfalfa area at each

farmer plot and investigate any possibility of expansion outside the pilot in accordance to available reclaimed water.

2. Sheep production

Sheep production assumes a particular importance in Jordan for economical, social and cultural reasons. It contributes significantly to the national and agricultural output and provides an important section of the local nutritional needs. According to the recent information of the MOA, sheep population in Jordan counts to around 2 million heads and provides about 44% of the local red production (33% self sufficiency).

The main sheep production system in the past was the nomadic grazing where flocks moved through the country according to the availability of forage and water. This system has shrunk and changed to the semi extensive or mixed farming systems. In addition, some others raise sheep in an integrated mixed farming production where most of the feed is produced by agricultural holdings as crop residues. Such system is used by a wide section of the sheep raising community where the flock is cared by the family members and aimed to produce milk and meat for their families mainly and to sustain a source of income in some cases.

Due to the restricted water availability, Jordan looked for new water resources especially in the field of agriculture. Recycled (reclaimed) water has provided a good option in this field mainly to produce forages for animal production. Projects like this have many objectives. It provides water which aid in solving the water problem, produce forages for livestock which aid in the solving the shortage in feedstuff, and contribute in improving income for those who work these projects.

3. Planting herbs and medical plants

The world's biological diversity is very rich and often undervalued. Genetic diversity is a defense against the genetic vulnerability, thus the conservation of plant genetic resources has been a shared priority of agricultural scientists,

geneticists and conservation biologists for many years. Many plants species that are originated in the world have become lost. Cultures from ancient times to the present day have thoroughly exploited biodiversity. This rely a responsibility on countries which still have a significant amount of genetic diversity and species diversity, even if small, to themselves as well as to the world to conserve it and make it available for use. Thus, to properly conserve a plant material a clear and specific conservation strategy must be planned before start working. Conservation strategy must take into consideration the time dimension (short, medium or long term storage) and location and equipment of storage. However, effective conservation of plant genetic resources requires a sound scientific and technical base, since reliance on field gene banks only can be both costly and risky. The maintenance of biodiversity is essential for allowing the sustainable development of various human activities. Maintaining genetic diversity in plant species enables both social and economic systems to flourish, and helps to ensure that all socioeconomic groups can meet both their present and future nutritional and cultural needs.

However, the loss of biodiversity due to over-exploitation of natural populations, harvest without permits from the wild, natural hazards, cultural, political and economical issues, pose a great threat to plant genetic resources. Moreover, there is an increasing awareness of the relevance of biological diversity and its conservation to the health of the biosphere. Many plant habitats have been destroyed or disturbed by increased agricultural activity, and an increasing world population. The required increase in food production must be obtained through sustainable forms of agriculture that are less dependent on the use of modern high-yielding varieties bred for intensive production systems.

The most common method of preserving the genetic resources of any such species is as plants in the field. There are, however, several serious problems with field gene banks, such as exposure to attacks by pests and diseases and natural hazards. Moreover, labor costs and the requirements for technical personnel are very high. Field gene banks are costly to maintain, and hence economic decisions may limit the level of replication of accessions, the quality

of maintenance, and even their survival in times of economic stringency. Due to all of these problems, it is not surprising that great efforts are now being made to improve on the quality and security of conservation that can be offered by field gene banks.

Since, field conservation of plant resources can be risky, ex situ (Collection sites) conservation offers a useful alternative or a complement to field conservation, because it overcomes some problems of germ plasm distribution. The ex situ conservation of plant material has involved an immense research effort over the last three decades.

Many important varieties of field, horticultural and forestry species are either difficult or impossible to conserve as seeds (i.e. having recalcitrant seeds) or reproduce vegetatively. Long-life trees and shrubs may be conserved in field gene banks as mentioned earlier. Vegetative propagates (tubers, tuber roots, bulbs, corms, rhizomes… etc) can be stored at low temperatures but must be regenerated often because they can lose viability easily.

Around the Mediterranean and the Middle East, wild woody plant species still exist in areas that have occupied for centuries, but they often grow in out of the way locations in mountains, deserts and steppes. However, many areas have been subjected to de-vegetation by grazing, harvesting and fire. The replacement or elimination of seedling orchards has made way for the planting of a small number of selected cultivars. Moreover, the use of imported rootstocks is likely to result in a decline in the performance of these rootstocks with time due to unfavorable environmental conditions especially drought and salinity. Maintaining the diversity of woody endanger plant species is therefore very important, because of the economic importance attached to many of the varieties. In order to prevent loss of these rootstocks and the germ plasm of these species as a whole, as well as to make way for further improvements in the range of varieties available, valuable genetic resources must be preserved, propagated and redistributed. The vegetation in Wadi Mousa is a typical example of endangered and threatened plant genetic resources.

4. Beekeeping and honey production

Beekeeping for honey production has long been practiced in Jordan using traditional method of housing colonies in hollow clay cylinders. In the last two decades, the numbers of traditional hives with fixed frames rapidly declined and were replaced by modern hives with movable frame-Langstroth hives. It is well known that most of Jordanian areas are subjected to semiarid conditions, keeping honey bee colonies for honey production has been well established under Jordanian semiarid conditions.

Development Agencies and host organizations are nowadays more interested in introducing apiculture in Integrated Rural Programmes. Beekeeping plays a central role in Integrated Development Programmes especially in view of the socio-economic point of view that, it can provide employment to all members of the rural family, can be adopted either as part or full-time work, stimulates community spirit and social contact and helps rural people to become self-reliant. It is estimated that each hive can generate about ($150) a year. While from ecological view, beekeeping has a positive effect on the environment; it can have a positive influence on nature specifically on the pollination of cultivated and wild plants. In addition, this activity does not occupy land or even require ownership of land.

Beekeeping depend on the presence of forage flowering plants, good weather conditions and good knowledge how to keep honey bees. Two factors are available in Wadi Mousa 1) farmers in the area can successfully produce alfalfa continuously over ten months of the year using reclaimed water on top of the availability of different wild herbaceous plants and shrubs in the area, 2) the sunny warm weather condition prevailed most of the time in the area. Most importantly, the third factor concerning how to keep bees. This factor will be covered by well designed practical on hand training program that cover all aspect of beekeeping and honey production.

5. Revolving Loan Fund

The Wadi Musa farmers will need a source of affordable financing to be able to irrigate with reclaimed water. The investment in an on-farm drip irrigation system amounts to about JD 150 per dunum. If the irrigation system is not considered a project cost, farmers will need long-term financing for these facilities. In addition, long-term financing may be needed for buildings and machinery Intermediate-term credit is needed for such purposes as the establishment of tree crops, which require expenditures for several years before they mature and begin to produce. For example, the cost per dunum of establishing a pistachios orchard is about JD 400, and it takes 6 or 7 years for the trees to reach full production. Short-term credit is needed for operating capital, especially during start-up.

The annual working capital requirements range from about JD 40 per dunum for barley to JD 154 per dunum for ryegrass. Farmers and farm related businesses are often vulnerable to credit access problems because of the relatively small scale of their operations, potential high credit risk, and the remoteness of rural areas. To ensure the availability of the necessary financing, it is recommended that a Revolving Loan Fund (RLF) be established to promote economic development in the Wadi Musa – Petra region. The RLF should target farmers irrigating with reclaimed water in the region, and related agricultural industries able to demonstrate a competitive advantage in supplying agricultural inputs and processing outputs, such as forage crops and tree crops. There also is a local market for the sale of cut-flower products to tourists and hotels. Examples of activities that could be funded include: dairy product manufacturing or fodder baling and transport enterprises. The RLF should be used to provide gap financing, encourage investment, create permanent, year-round jobs, help retain and expand existing businesses, attract new business, encourage development of modern industrial technology, and promote a safe, healthful work environment at Wadi Mousa. Reference: Marketing and Economic

Implications of Irrigation with Reclaimed Water in Jordan **(Technical Report by PA Consulting Group, Jordan Wastewater Reuse Implementation Program, USAID).**

Project (1.1) Approach

The primary aim of this project is to develop the sustainability of reuse activities and on-farm integrated agriculture in Wadi Mousa. The proposed approach will aim to integrate reclaimed water use in fodder production; fodder production will be used in sheep production. Propagation and redistribution of endangered plant species, medical and herbs plants production will be used in Beekeeping and honey production.

Objectives

Specific objectives of the proposed project are to:

- Optimize reuse for agriculture production - alfalfa plantation areas, install and replace drip GR-lines (useful life 5 years), maximize irrigated area through soil reclamation and expansion, and maximize return per m3 of reclaimed water.
- Help establish on-farm integrated agriculture. Establish a sheep farming production on family basis benefiting from the availability of forages produced from the reuse area. Feedstuff produced from each family holding (alfalfa and fodders) will be utilized to feed the flock.
- Develop effective propagation methods for important endanger and endemic native Jordanian plants. Redistribution of produced endemic plants. Initiate herbs and medical plants production and protecting endanger Wadi Mousa native plants.
- Community resilience and adaptation to climate change through improved and upgraded household generated income of poverty pockets and nomadic local Bedouin communities at Wadi Mousa by becoming aggressive beekeepers, train selected farmers leaders to become experts on beekeeping production and to disseminate their knowledge to the rest of the community.

Project (1.1) Set Up and Steering

The main goal of the reuse project at Wadi Mousa is maximize the reuse of WWTP effluent as a community adaptation method to climate change where the reuse of reclaimed water can be demonstrated to be a productive, economical, reliable, environmental and sustainable irrigated agriculture that can replace the use of fresh water supplies (as ground water aquifers are already under stress in Jordan due to over abstraction).

About 1069 dunums (106.9ha) are proposed to be served by modern irrigation networks and planted mainly with alfalfa, winter fodder crops, fruit trees and native landscape plants. The area has been initially divided into 40 farms plots, each of about 20-25 dunums. The 40 farms that were distributed among 40 low-income families who have had historically the right to rain fed cultivation of the land. Among the 40 farmers, 6 women farmers were chosen. Training for the farmers on good agricultural practices, irrigation management and proper handling of reclaimed water used in irrigation will be initiated. New technologies will be introduced to the farmers, which would included high technical drip irrigation as well as mechanical alfalfa mowing and baling.

A Water User Association (WUA) titled (Red Dam WU Association) which was established in January 2008 at Wadi Mousa for the reasons explained above will ultimately take over the responsibilities of managing farming issues following the end of the project when capacity building measures are completed. Furthermore, the establishment of a revolving fund will assist farmers in improving and expanding their farming practices in the future. His Majesty King Abdullah the Second donated 30,000 JD ($42,250) to the revolving fund as a supportive and blessing gesture towards the efforts to improve the low-income families' standard of living.

As an outcome of the re-use project in Wadi Mousa, families' income is expected to be increased significantly by more than four times, with no treated

effluent discharged to the adjacent valley (wadi) due to full reuse of the effluent, thus improving the environment and contributing to local labor employment and their resilience and adaptive capacity to the adverse effects of climate change.

Under this activity it is planned to provide a sub-grant through an Other than Full and Open Competition to the Hashemite Fund for the Development of Jordan Badia (HFDB) to procure their Services for implementation of continued technical assistance services for the Wadi Mousa Reclaimed Water Reuse for Integrated Agriculture as detailed above. The expected project completion date is four years from date of award on/around January, 2014.

Management activities will include:

- Work with the WUA on all aspects of pilot project management through setting up of a ***satellite field project management office***.
- Represent the WUA and the project with GoJ various agencies on as needed basis.
- On as needed basis; represent the project & WUA in meetings with donors and in coordination meetings with other national and international parties.
- Follow up Wadi Mousa WWTP effluent water quality with Aqaba Water Company (AWC) to make sure it is within the permissible standards.
- Assist the WUA in managing the irrigation schedule.
- Assist the WUA in managing the O&M of the project machinery and the irrigation main lines and its working schedule.
- Establish seasonal plantation policies; monitor the cropping pattern to make sure compliance with regulations.
- Employ and manage the pilot project staff including the pilot project manager, laborers and guards.
- Pay the salaries and fringe benefits of the pilot project staff.
- Assist the WUA in managing the revolving fund once it is established.
- Keep the records on production, water usage, machinery O&M, water quality, machinery operations.
- Continue mentoring the WUA to build its capacity to be able to manage all

above aspects on its own in the future.

- To coordinate with the Petra Regional Authority (PRA) and the Wadi Mousa WUA for information and consent for the planned transition.
- HFDB will manage and supervise the operation of the activities
- HFDB agrees to be responsible for the running costs and have the project staff as its own (HFDB) employees starting effective day

HFDB has already invested money, time and effort in contributing to the achievement of comprehensive development in the different Badia locations in Jordan and to improve the living standards of its people as well as utilizing their capabilities al of which are under the umbrella of combating poverty (water and financial), community climate change adaptation and resilience initiatives.

HFBD has in-house capacity and expertise to monitor and evaluate projects and thus manage well the Wadi Mousa Reclaimed Water Reuse for Integrated Agriculture Project and its related works which is already going online with the HFBD objective of contributing to the achievement of comprehensive development in the different Badia locations in Jordan. It also helps to improve the living standards of its people as well as utilizing their capabilities.

Project (1.2): The Northern Jordan Valley Wastewater Reuse Project

Background: Northern Jordan Valley is located north of Jordan and it is part of Irbid Governorate, it occupies an area of 183 thousand Dunums. The average rainfall is 300 mm/year people living there depend on agriculture &grazing for their livelihood in addition to governmental jobs and commerce.

The poverty rate in the northern Jordan Valley is around (28.6%) compared with the rate of poverty in the governorate of Irbid (7.14%) and in the kingdom (13.3%). Land suitable for cultivation is around 183,000 Dunums where 135,000 dunums is already planted, 100,000 dunums are irrigated and the rest is rain-fed agriculture. The Jordan Valley Authority (JVA) is responsible for the supply

of bulk water needed for the irrigation of different crops. Figure (1.2.1) shows the locations of the WUA in the Jordan Valley

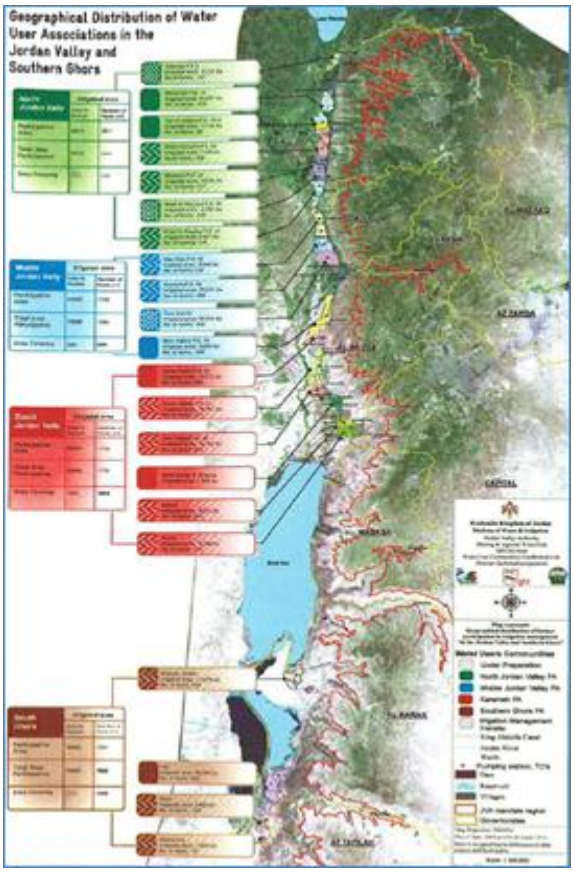


Figure (1.2.1): Map of the locations of the Water User Associations (WUA).

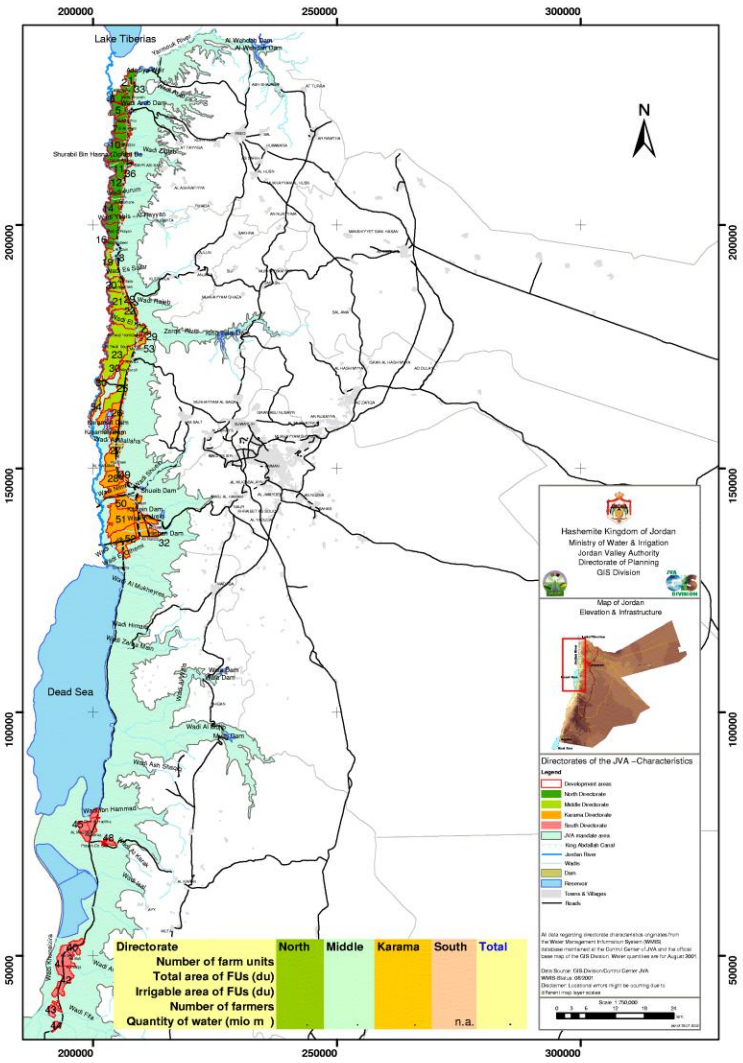


Figure (1.2.2): Map of the four geographical regions of Jordan Valley & farm units.

Objectives

Farmers in northern Jordan Valley are facing lots of challenges, starting from the scarce water supplies, marketing, and the remarkable increase in the costs of agriculture inputs and production compounded with the climate change impacts, all of which is compounded by the high cost of the expatriate labor (manpower costs).

Despite the insufficient water, farmers in the Valley show remarkable cooperation, and water users associations were able to distribute irrigation

water fairly, raising the slogan of transparency and integrity, but the problem of maintenance continue to constitute a real impediment and challenge for both the Authority and WU Associations, but the size and quality of the agricultural produce is very good for this current year, which gives a positive indication for the need to improve the performance of Water Users Associations.

Proceeding from the intention to improve the economic and social situation of these farmers, GOJ is emphasizing on the necessity of supporting them adapt to a different water quality to supplement their irrigation needs, changing cropping patterns, and finding external markets for the Jordanian produce, taking into consideration that the Jordanian agricultural produce equals the quality of the agricultural products in developed countries.

The Jordan Valley Water Forum (JVWF) which is designed by the World Bank Institute and supported by GOJ as a process and mechanism for multi-stakeholder engagement aimed at solving critical issues facing the water and agribusiness sectors throughout the Jordan Valley. Prior to the Forum launch on June 11, 2012, no mechanism existed in Jordan's water sector for an inclusive and transparent dialogue between public and private sector stakeholders. The private sector farmers only engaged their government counterparts via informal and ad-hoc practices. Through the Forum process, farmers can voice concerns in a coordinated manner and specific issues and recommendations for improving the water sector can be decided and prioritized through dialogue between public and private sector participants. The selection of prioritized recommendations is based on both selection criteria such as the potential to improve the sector for the most farmers possible and the public sector's ability to realistically implement related activities.

Since the conception of this collaborative governance process in December 2011, there has been a growing interest from both the public and private sector stakeholders in the Jordan Valley water sector to participate in the dialogue and improve policy-making in the sector. With the assistance of representatives of the Jordanian water sector and legal experts, the PSGG team met with hundreds of farmers from throughout the Jordan Valley along with government counterparts at both the ministerial and working levels. Under the guidance of the PSGG team, the stakeholders iteratively, self-designed a Forum process

that works for them. The PSGG team then trained them on how to actively participate in such a multi-stakeholder engagement platform.

Given the volatile social climate in the region, participation in collaborative governance practice on critical issues such as water is more important than ever. Including the informal sector and employment, it is likely that agribusiness in the Jordan Valley accounts for at least a quarter of the country's overall GDP. In addition to this substantial contribution to the country's economy, the Jordan Valley is one of the primary producers of fruits and vegetables for the entire MENA region. Disruption to irrigation services in the Jordan Valley can have an impact on food security for the region. In the face of climate change, which is also a contributing factor to the availability of water in Jordan (one of the most water-poor countries in the world), the timing for the implementation of a collaborative governance mechanism to prioritize and solve issues in the water sector has been ripe

Project (1.1) Set Up and Steering

Here, under this project, emphasis will be on the one of the key themes identified by the Jordan Valley concept of participatory approaches in solving vulnerable farmer and water users communities' problems', and working hand in hand on paving the road map for every area in the valley, depending on the specificity of each farming area in terms of the quality and quantity of water and produce. Adaptation to climate change and use of treated wastewater as an alternate and a resource to augment the irrigation water needs.

The Northern Jordan Valley Wastewater Reuse Project will utilize treated effluent from three currently being upgraded/constructed wastewater treatment plants in the northern region of Jordan at Irbid, Shalalah, Dogara where the treated effluent as required by Jordan Valley Authority must meet the highest standards before it is offered for irrigation with no potential adverse impacts to the irrigation systems there or to the farmers and when leaving the WWTP must meet and be in compliance with JS 893/2006 for cooked vegetables (class A). This treated wastewater as a substitute for fresh water supplies is aimed for alleviating the water scarcity aggravated by climate change. On farm application will be of mixed water quality subject to the "Irrigation Water Quality Guidelines which refer to unrestricted irrigation and the blending/mixing of irrigation water

to achieve these guidelines. Current and proposed crop patterns to be considered are (fruit trees /citrus, bananas and vegetables not eaten raw).

The total project irrigated area is utilizing 5,394 Hectares. This figure will not change in the future according to JVA while the crop composition will undergo significant changes. The main objective of the anticipated changes to the crop composition is to favor water-effective cropping models to reduce the total irrigation water demand and alleviate climate change impacts on the crops caused by water scarcity.

The main crops are citrus trees plus other tree crops, bananas and vegetables representing 78% of the total area. There are plans to replace over aged citrus trees in the northern valley with new more productive citrus varieties and citrus/ alfa or citrus /date palm varieties. Vegetables eaten raw will be replaced with those eaten cooked such as potatoes, squash, okra and egg plants which have the same if not better income opportunities and which requires a level of technology not unfamiliar to local farmers.

Management activities will include:

- Install the best available technology of water filtration systems in the targeted areas of Jordan Valley to provide clean water for the remote communities and ensure better health & safer Environment.
- Introduce water treatment and softening technology(ies).
- Assess the potential of reclaimed water desalination projects
- Link operational irrigation systems to the storage dam/facility of the wastewater treatment plants that is capable of utilizing all of the available effluent in peak months.
- Support the farmers in the northern Jordan Valley to adapt to new water quality (wastewater) for irrigation of citrus farms, improve on-farm water management, especially to deal with water quality-related issues.
- Awareness raising campaigns and further support to the agriculture advisory service are to be established to inform and consult the farmers
- Water quality monitoring (both micro-biological as well as selected

physio-chemical parameters) are to be enforced and supported with ISO 17025 laboratories accreditation (Jordan Food and Drug Administration) and JVA/Ministry of Agriculture labs for crop, soil and water quality monitoring

- For agriculture irrigation practices, careful irrigation water management is required.
- A comprehensive soil survey is recommended in relation to soil quality, baseline data and soil salinity
- For salinity management, and according to climatic data, effective rainfall will satisfy most of the leaching requirements during the winter months. Remaining leaching needs should be confined to the months of January and February where crop water requirements are low but water availability is high.

Rain Water Harvesting:

Project (1.3) Community resilience and adaptation to climate change through water harvesting technologies in poverty pockets

Background: Water is a vital resource for crop production in rainfed-farming regions, particularly in countries under severe water stress conditions like Jordan. Water resources in Jordan are greatly affected by the prevailing climatic conditions, and mainly by the seasonal erratic rainfall distribution. Rainfall often occurs at high intensity at times when crop water requirements are minimal. The total area of the country is about 89.206 km2. The majority of this area receives approximately 200 mm or less of rain per year. Furthermore, the total amount of rainfall received by this area largely exceeds all other utilized sources of water in Jordan. This fact indicates the importance of water harvesting in such areas.

The reports of the Ministry of Water and Irrigation show that Arab countries will lose about 26 billion cubic meters of water by 2030. We are therefore looking forward to search for alternative resources of water and construct dams in order to reduce the lost quantities of rain water which reach millions of cubic meters,

by rehabilitation of the damaged irrigation networks, adding thereto, the necessity of protecting our water resources from pollution.

For a sustainable urban future, society must move towards the goal of efficient and appropriate water use. Rainwater harvesting has a significant role to play in this Project. Water availability has been a matter of concern all over the world. This technology is used for collecting and storing rainwater in earthern check dams. Harvested rainwater is a renewable source of clean water that is ideal for agriculture in rainfall water short seasons.

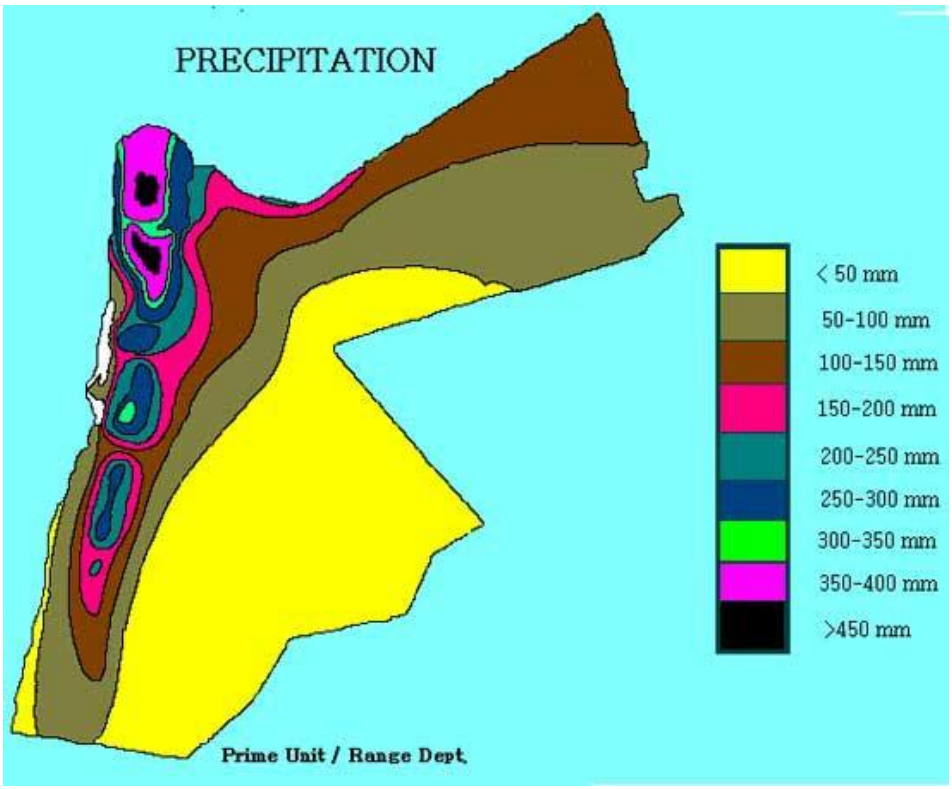


Figure 1.3.1 Average annual rainfall in Jordan

Table 1.3.1: Jordan's rainfall depth and it's distribution over the different zones.

Area	Rainfall (mm)	Area (km')	Percent of Total	Average Weighted Rainfall (mm/yr)	Rainfall Volume (MCM)
Desert	<100	633849	71.5	53.05	3,414
Arid	100-200	19,914	22.3	147.00	2,947
Marginal	200-300	l,965	2.2	250.24	513
Semi Arid	300-500	2,947	3.3	393.22	1,160
Humid	>500	625	0.7	650.00	390
Total		**89,300**	**100%**	**93.60**	**8424**

Most of Jordan's land area (44%) is ranked as a hilly area, followed by plains or flat areas (33%), and the remaining (23%) is for mountain areas.

Table 1.3.2: Jordan's rainfall distribution over the main topographic classes.

Rainfall Zone (mm/year)	0-8% Slope		9-25% Slope		> 25% Slope	
	Area km^2	**Percent of total area**	**Area km^2**	**Percent of total area**	**Area km^2**	**Percent of total area**
200-300	1302.18	16.6	1757.82	22.1	891.07	11.1
300-400	591.90	7.4	799.05	10.1	405.04	5.1
>400	736.59	9.2	994.31	12.4	504.04	6.3
Total	**2630.67**	**32.9**	**3551.18**	**44.18**	**1800.15**	**22.5**

Jordan is an arid country whereby water is the major limiting factor for agricultural production. Jordan has very limited water resources. In 2007 demand exceeded renewable resources by 75%. More than ninety percent of the available surface water

resources are captured in reservoirs and used mainly for irrigation. Groundwater resources are 'mined' and overexploited by over 60% and both water quantity and quality of aquifers are therefore endangered. Annual per capita water availability is 145 m^3 per year (which is far below the international water-poverty line of 1000 m3/year) and dropping continuously with population growth. The increasing water deficit year-on-year poses a serious future threat that can affect all sectors of the economy. Rainfall variability is high in addition to the trend of decreasing rainfall amounts resulting from climatic change. Jordan faces long-term challenges due to increasing frequency of drought and the impact of climate change during the last three decades on available water resources.

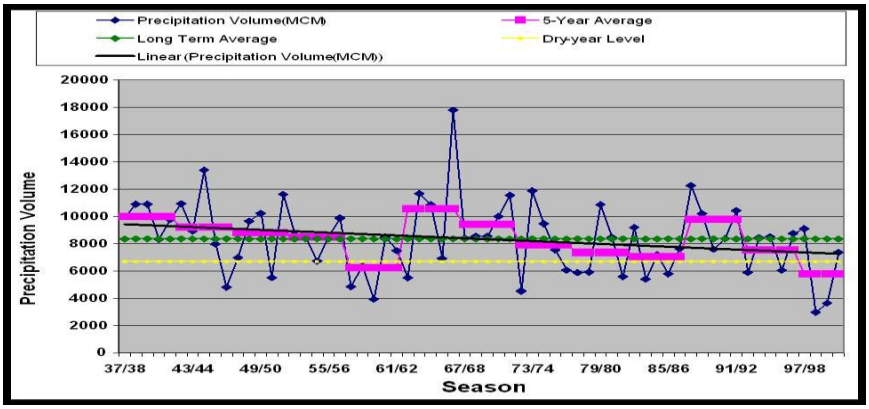


Figure 1.3.2: Annual fluctuation of rainfall volume over Jordan.

The limited productive resource base, coupled with population growth resulted in a decreasing self-sufficiency rate in most food commodities. This situation emphasizes the urgent need to focus on conservation and efficient development and use of available land resources.

On the policy level, Jordan's Water Strategy 2008-2022, published in February 2009, and its preliminary Action Plan, identify actions that must be taken to ensure that water is available in the future for people, business and nature conservation. It sets goals for water demand management (enforcement of groundwater use reduction for irrigated agriculture in the highlands, public awareness on the need for water savings, use of tariff structure as an incentive for water savings); water supply (reduction of losses,

improvement of storage, desalination, reuse of treated wastewater, reuse of grey water and rain harvesting at household level); institutional reforms (water law, water user participation); improvement of irrigation water management (reuse of treated wastewater, rainwater harvesting, improvement of irrigation efficiency); wastewater management (improvement of effluent quality, protection of resources, extension of sewerage systems, risk management of treated wastewater used for irrigation); and alternative water resources.

The agricultural sector consumes more than 58% of the available water resources. Water demand is greater than the present available water resources. Water shortage in 1991 was 358 MCM, and was 664 MCM in the year 2005. Even with the expected government strategies and future plans to solve the problem of water shortages, it is still expected that the water deficit for all uses to be more than 360 MCM/year by the year 2020 (MWI reports) mainly due to population growth.

Objectives:

Historically, agriculture using surface run-off and rainwater harvesting techniques was extensively practiced as early as 4000 years ago in Jordan. Some of these structures are in good operating conditions such as the Roman pools near Ajlun, Madaba and Mwagger. Flood water is mostly lost by evaporation; it is estimated that the volume of water lost in this manner exceeds all the utilized sources of water in the country, so harvesting part of this water should be a priority. In the absence of run-off sewer lines in some Jordanian rural areas, rainfall harvesting can increase water supply and help combat the chronic water shortages for rural communities and assist them in combating climate change impacts in the country. Moreover Rainwater harvesting could be one of the very good options for irrigating crops specially in poverty pocket areas such as Ghore Al Mazraha/Ghore Hadeetha which were classified as one of the poverty pockets areas in the kingdom where the poverty rate reaches (44.1%) compared to poverty rate in Karak which amounts to (17.1%) as compared to the poverty rate in the kingdom which is (13.3%), noting that Ghore Al Mazraha/Ghore Hadeetha is part of southern Jordan Valley which is one of Al Karak districts. The average rainfall reaches only 70 mm/ year. All regions of Ghore Al Mazraha is covered by (83.3%) by major & minor water networks. Drinking water is supplied to the area by (3) water wells. The low number of subscribers

in the drinking water network is because it doesn't reach some residential areas, that's why some residents take water from neighbor because of their difficult financial situation.

Ghore Al Mazraha & Hadeetha are irrigated by WUAs through irrigation projects managed by Jordan Valley Authority; farmers depend on drip irrigation systems and agricultural ponds to irrigate their crops. The area of agricultural land is about (45) thousand acres, (33.3%) of them is irrigated agriculture. That's why these two areas could have a very good potential to implement rainwater harvesting projects.

Rainwater harvesting not only provides a clean source of water to increase water supplies but also it involves the public in water management, improves the quality of life and community resilience specially in arid regions and contribute to climate change adaptation.

The main project objectives and goal is to plan and implement watershed management with focus on water harvesting techniques to help the communities in improving their livelihoods through:

1. Sustaining land production and high quality water
2. Restore productivity of degraded lands
3. Reduce soil erosion and sediment export
4. Improve stream channels
5. Reduce flood damages
6. Improve water harvesting efficiency

Specific objectives include:

a- Develop an integrated watershed management approach based on participatory approach and involving local community, planners, and policy makers at all levels for land management, biodiversity conservation, and water-use by the community at the watershed scale.

b- Involve communities in planning and managing their watershed.

c- Achieve a balance between resource use and resource conservation.

Project duration: The duration of the project will be 4 years.

Sandards that will be followed for the rainwater harvesting component: Jordan has a strong enforcement system that calls for compliance with codes, standards and regulations., So for the efforts to be undertaken under the rainwater harvesting component will have to get the approval from the relevant GOJ entity, here Ministry of water and irrigation represented by the Jordan Valley Authority who would give approval on the chosen locations for the collection system and infrastructure of the check dams and only approved and classified contractors (classified and regulated contractors) are allowed to execute construction and collection systems. National environmental and public health and safety regulations will be applied and Environmental Impact Assessments may be required for where a determinationthat a certain project or activity may have a negative impact and needs to be regulated..

Implementation Plan:

This type of work will depend on the principles of integrated watershed management. Watershed management can be defined as the process of guiding & organizing land and water resources to provide desired goods & services without adversely affecting soil and water. This approach recognizes linkages between uplands and downstream interests, and facilitates development of sustainable management solutions to current land and water degradation problems. It also includes de-centralized water harvesting activities, inter basin water transfers, and water allocation to economically efficient uses.

To be able to do that the project should have an effective Project Management Unit (PMU) capable of directing and supporting project implementation plan. A steering committee is also required and would include representatives of potential partners involved in the implementation of the action plans. Partners could include NGO's , CBO's and cooperatives representing the communities and those partners can use grant money as revolving funds to members in the local communities to help them to benefit from the project.

The interventions that would be implemented can include the following:

No.	Type of Technique	Use of Technique
1	Hafeer or water ponds	Water storage for livestock watering
2	Traditional pits	Water harvesting for Atriplex shrubs

No.	Type of Technique	Use of Technique
3	Contour ridges (traditional plow)	Water harvesting for Atriplex and Salsola shrubs
4	Vallerani continuous contour ridges (4, 6, 8, 9 and 12 meter spacing)	Water harvesting for Atriplex and Salsola shrubs
5	Vallerani intermittent contour ridges (4, 6, 8, 9 and 12 meter spacing and 3 different sizes)	Water harvesting for Atriplex and Salsola shrubs
6	Narrow strips	Water harvesting for Barley using the seed drill
7	Contour strips (1:1 and 2:1 catchment to cultivated area with 2 different seeding rates)	Water harvesting for Barley
8	Stone check dam (different designs)	Soil conservation and to slow the velocity of flowing runoff water in a drainage way.
9	Earth check dam (concrete spillway)	Soil and water conservation
10	Earth check dam (gabion spillway)	Soil and water conservation
11	Semi circular earth check dam with side stone spillway	Water harvesting
12	Water collection cistern	Different uses according to water quality
13	Water spreading bunds	Barley and/or fruit trees
14	Contour bunds	Cactus and/or Barley
15	Earth dam	Livestock watering
16	Rooftop water harvesting	Household water supply
17	Stream bed improvement	Manage water flow in the stream bed

GIS and Remote Sensing tools will be used in planning and along the duration of the project. Also a monitoring and evaluation component is also included to monitor project activities during the project duration.

Project Site(s):

The National Center for Agricultural Research and Extension (NCARE) defined a method for site selection of watersheds for water harvesting techniques depending on a set of

criteria (rainfall, topography, accessibility, and the presence of communities) and scoring to help in the selection process using the GIS as a tool.

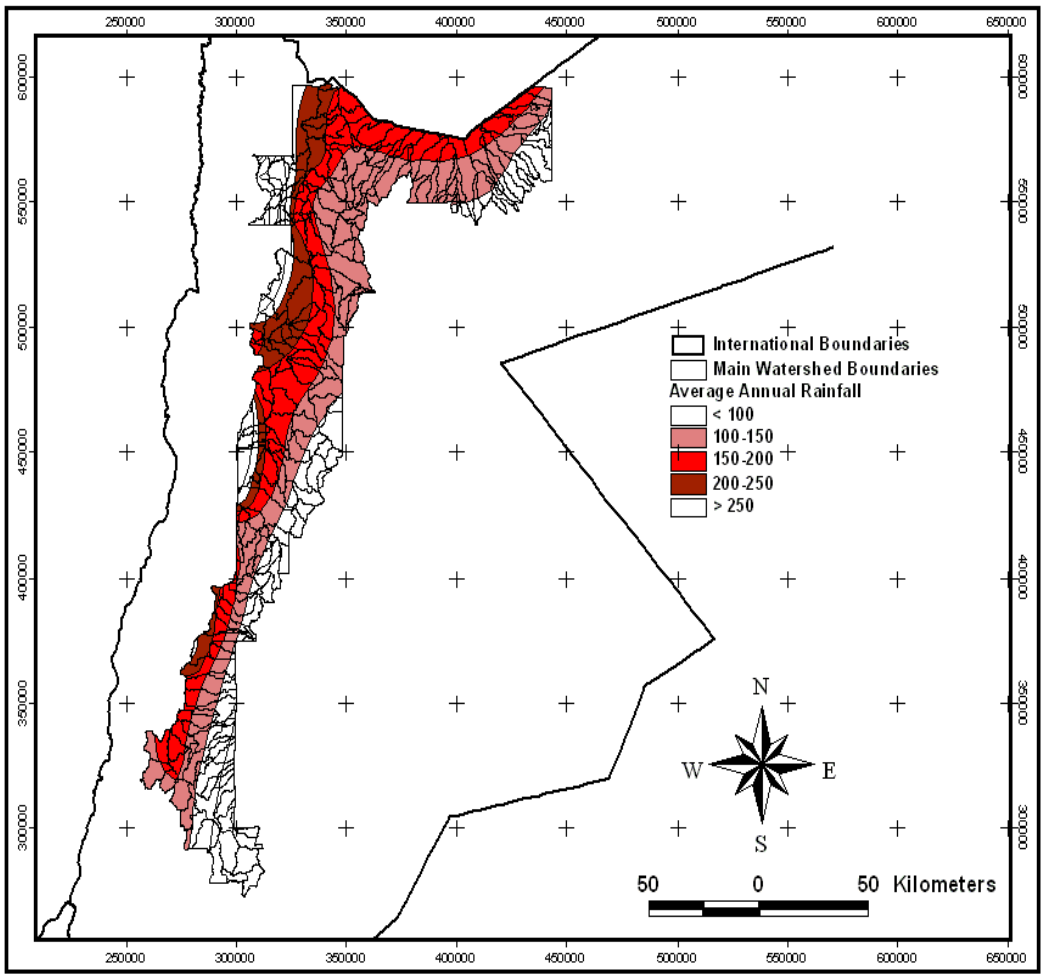


Figure 1.3.3: The rainfall isohyetal map with defined watershed boundaries that are located within the 100 – 250 mm rainfall zone. This area (13600 km^2) comprises 15.3% of Jordan's land area.

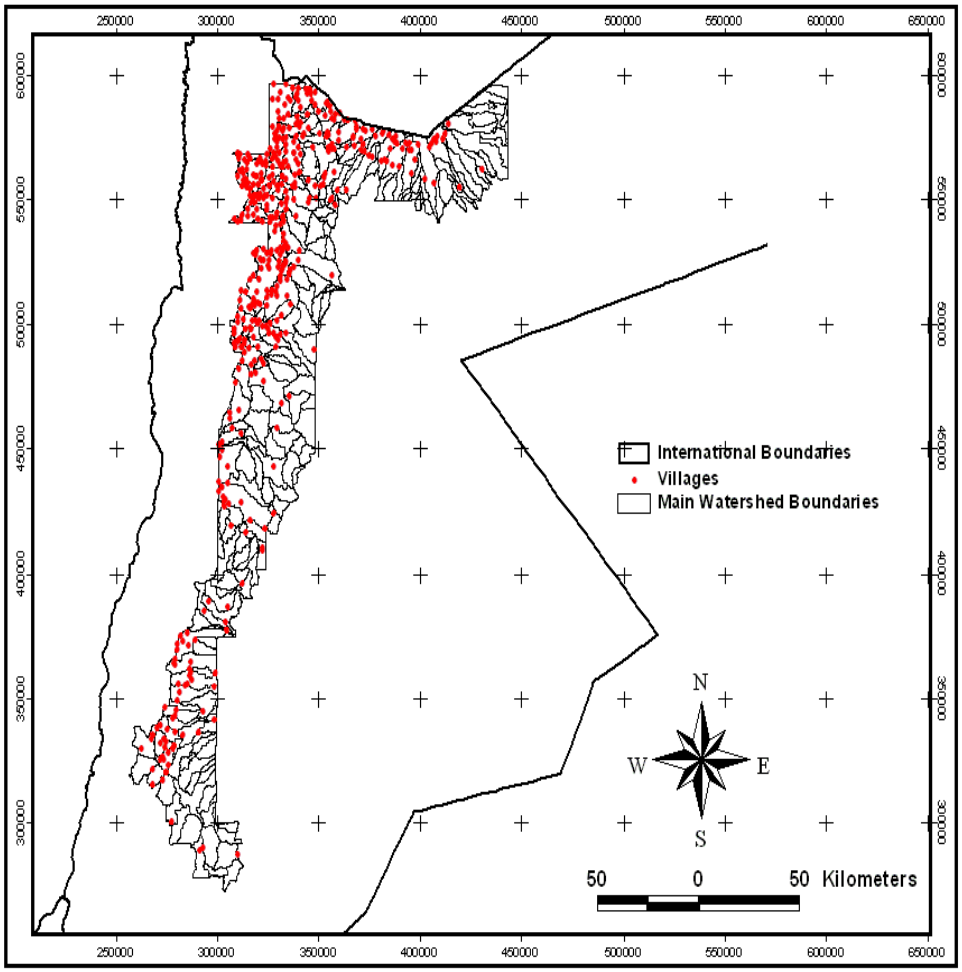


Figure1.3. 4: The distribution of villages and communities in the selected zone.

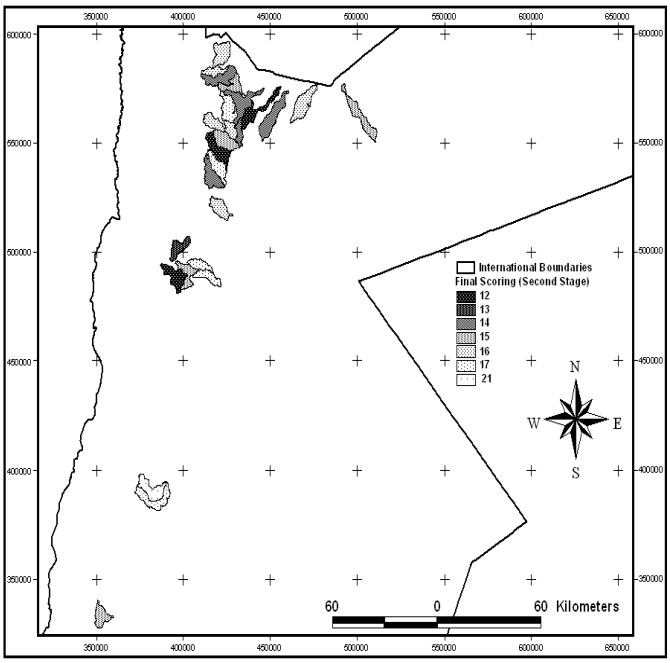


Figure 1.3.5: Final scoring stage for the selection of suitable watersheds.

This zone is just an example in defining potential sites for the project. The sites can also b outside this zone particularly in the southern part pf the Kingdom close to the Dead Sea region. Several watersheds are located there where they can be very useful to the communities in Ghor Al-Mazra'a, Ghor Hadeetheh, and Ghor Al-Safi. Any harvested water can be used in irrigated agricultural activities in those areas. Other potential watersheds are located in the Jordanian Badia region.

Figure 1.3.6: Google Earth image for Ghor Hadeetheh, and Ghor Al-Mazra'a watersheds.

Figure 1.3.7: Google Earth image for Ghor Al-Safi watershed.

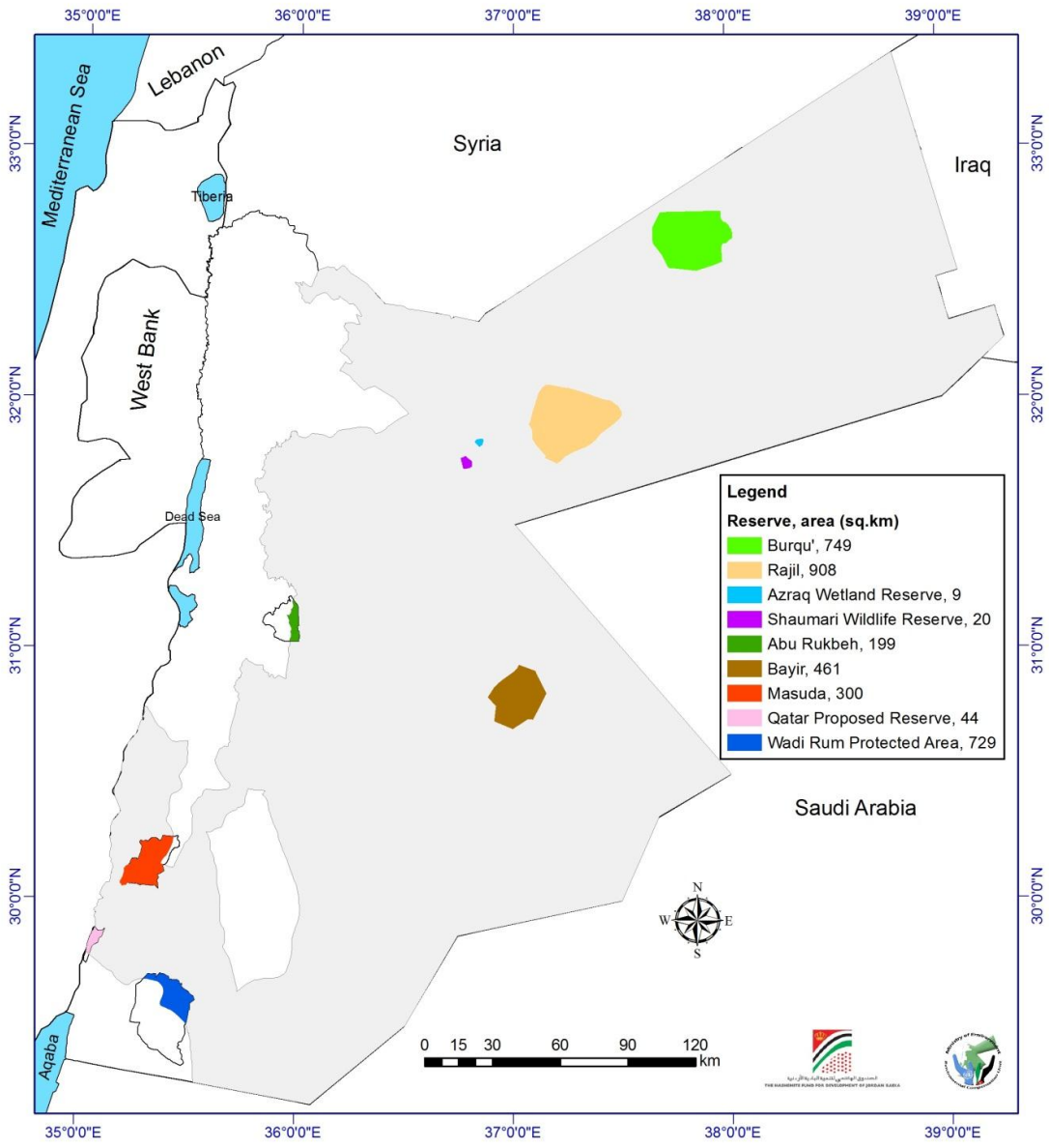


Figure1.3.8: Potential watersheds in the Badia region of Jordan.

These watersheds have a total area exceeding 500 square kilometers and start from the mountain area receiving relatively high rainfall. The largest watershed among those is Seyl Al-Karak with an area exceeding 175 square kilometers. The volume of runoff water that flows in the main stream bed in this watershed is quiet big and can be utilized for more than one purpose. The project site(s) will be selected according to a new set of criteria to suit the objectives of the project.

There are other potential areas in Jordan that have a huge potential for rain water harvesting, there is around 223 Localities or (remote communities) in the Badia (Jordanian desert), the map shows that the localities becomes more dense as we go to the north and less as we move to the south.

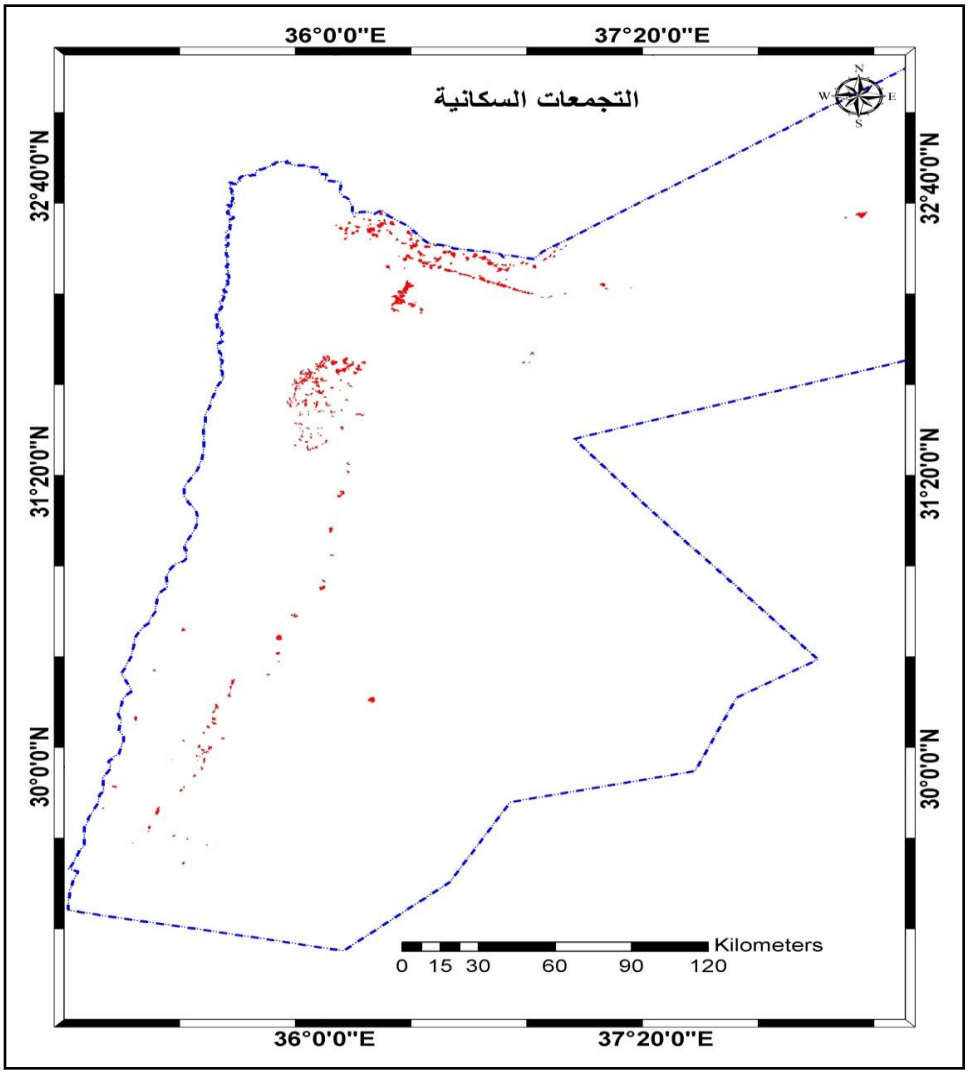


Figure (1.3.9): Localities and their proximity to water harvesting projects

Activities relevant to project (1.3):

- Obtain rainfall data, potable water supply, population and number and area dwellings in each targeted community.
- Installation of basic components of a rainwater harvesting systems which are for remote region and areas identified as poverty pockets.
- Build Dams which are required for storing flood waters during the wet winter season and releasing the water gradually during the summer season when the demand is high.
- Build reservoirs, called desert dams (water harvesting), to help increase groundwater recharge and provide water for pastoral use and assist remote Beduin communities become more resilient to climate change .

Project (1.4): Building Resilient Food Security Systems through Permaculture projects in climate change (Tal Al Mantah)

The Jordan valley is the most productive farmland in Jordan, which, owing to climatic conditions and availability of irrigation water represents the breadbasket of Jordan – especially for warmth loving fruits and vegetables. For this reason, agriculture along with some tourism forms the key 'industries' of the Jordan Valley.

A pilot The Jordan Valley Permaculture project (in Ghore Mazraha/ Ghore Hadetha) intends to rehabilitate 4 hectares of nonproductive farmland in the southern Jordan Valley, under high salinity and drought conditions, using the integrated sustainable design science of Permaculture. The primary goal of this project is to demonstrate the potential for improving the livelihood and living conditions of humans in the Jordan Valley using low-cost, low-tech approaches. Permaculture depends on the application of specific agricultural patterns and practices that aim for sustainable use of soil, water, plants and animals by design. It is an integrated system for the environmental management of

agricultural process, natural resources, local community and environment in one design system package.

This area suffers from severe droughts and very low fertility in the soil. The soil is very low in organic matter and there is a general absence of natural vegetation cover. The present vegetation of the surrounding area includes only scattered wild plants that are tolerant of high salinity. Irrigation water is mainly from artesian wells, of salinity about 4dS/m. The area is exposed to frequent strong hot winds that cause erosion of the poorly structured soil. According to the Jordan Valley Authority, this land has been categorized as an extremely salty area.

The agricultural community in the Jordan Valley faces other problems besides water that affect the quality of farm products. This includes extensive use of chemical pesticides and fertilizers, water and soil pollution and solid waste pollution. These factors affect the quality of agricultural products and the sustainable use of natural resources. In addition, agriculture faces other issues that affect the sustainability of the agricultural process, such as the marketing of agricultural products and competition with regional and international markets.

In many successful implemented projects the results show that the application of permaculture methods and introducing permaculture techniques like swales, natural mulching, legume cultivation, have a clear role in improving soil properties, increasing soil organic matter content and reducing soil salinity.

Activities relevant to project (1.4):

- Determining the land area for the farm using standard surveying tools.
- Construction of plastic lined irrigation water storage dams to aid farmers in irrigation and rain water collection

- Introduce water saving technologies in irrigation schemes such as drip, micro-spray, night irrigation, etc that assist in adaptation to climate change through water resource conservation.
- Implementing an environmental monitoring program to assess the impacts of Permaculture practices on the farm and the natural resources. The program will include periodic soil, water and plant sampling and analysis. Crop yields and water use will also be monitored.
- Change of sowing dates and use of different crop varieties or species.
- Changing the agricultural cropping patterns in order to use crops that require less amounts of water and thus adaptable to climate change severity, that are salt-tolerant and have higher economic returns (such as avocado, mango etc.)

Component 2: Climate Change Adaptation Capacity Building, Knowledge Dissemination, Policy and Legislation Mainstreaming

"Knowledge is like light. Weightless and intangible, it can easily travel the world, enlightening the lives of people everywhere. Yet billions still live in the darkness of poverty- unnecessarily." (World Development Report 1999).

Background: Some studies found that the main capacity constraints identified in Jordan were: Lack of economic incentives for climate change adaptation; Weak institutional and technical capacity development for the Climate Change; Developing linkages between research, systemic observation and policy making; Lack of clear and systematic integration of the UNFCCC main concepts in the national policy formulation process, Capacity Development for Practical Education and Training, Capacity development for Knowledge management and networking, Capacity Development for National Adaptation Plans

Public awareness campaigns, capacity Building activities & knowledge dissemination are necessary, needed and crucial to explain the climate change possible impacts on water, agriculture and other sectors for the general public, farmers, building owners, policy-makers etc. Additionally More

audience-specific awareness events may be implemented through mass media, associations, chambers, schools, universities and water delivery utilities (water companies, Water Authority of Jordan (WAJ) and Jordan Valley Authority (JVA)).

The Government should also establish policies and enforce laws to ensure Jordan's water is used efficiently and delivers a high return per cubic meter consumed. Following this approach, all users would pay a socially optimal price of water. Unsustainable extraction of groundwater would stop in order to prevent lasting economic and environmental harm. In addition, the Government should consider creating a market for transferable water rights to help ensure optimal water use while guaranteeing farmers continuing access. Reforming current fresh-produce marketing requirements could increase returns to farmers. Creating and strengthening groundwater user associations could improve water allocation.

The recommended possible national climate change adaptation measures that must be implemented include:

Project 2.1 National Policy Capacity Building Needs for Climate Change Adaptation of Jordan's Agriculture Sector:

Building Database, Building capacity of research and extension by developing new technologies that are needed to meet Climate Change challenges, aid in the decision making process, transfer of new technologies to farmers, developing infrastructure of institutions, and ultimately developing necessary legislations for establishing a "National Umbrella for Climate Change".
The major efforts conducted in scientific research on climate change issues in Jordan are not finding their route to the policy making and management systems.

A capacity development component for creating an enabling system for linking scientific research to policy making and pilot climate change adaptation

programs such as this proposed one is of the major priorities for Adaptation to the stresses of climate change in Jordan. The research capacity building component should be focused on systemic observations and collecting, managing and utilizing activity data as well as capacity to establish a sustainable Observation System on Climate Change. It is worthy to mention that, encouraging the commercial agricultural production and food security especially for the low-income families is a critical strategy for climate change adaptation.

In Jordan there are four main governmental entities responsible for providing water services these are: The Ministry of Water & Irrigation (MWI), Water Authority of Jordan (WAJ), Jordan Valley Authority (JVA) and the Program Management Unit. The (MWI) is responsible for the formulation of national water strategies and policies, research and development and information systems.

In the face of the acute water insufficiencies in the Jordan Valley, there is a need to coordinate between public and private sector actors to ensure effective water resources management and sustainability, and enable agribusiness enterprises to adapt to climate change impacts while expanding, competing and attracting investment.

Reform and Implement Land Use Laws and Sustainable Land Use

Mapping of soil and land use status to understand & combat adverse Climate Change challenges, Determine alternative land use changes, that are sustainable, economical & socially accepted, Building capacity of research, extension to put into practice the Land Use Change, Transfer of new technologies to farmers (Land Use Change, Agricultural Practices, Water harvesting Techniques …), Reform current Land Use Laws under Integrated National and Solid Long-term Policies and Measures

Improve Water Use Efficiency and Water Management

Improve management of surface water resources, including better use of runoff, and water storage, Improve management of traditional and non traditional water resources, Monitoring of supply, quality, and management of water resources, Development of new methods of irrigation measurement and control, Building Capacity of Research and Extension by developing new technology to improve WUE, Development and implementation of WH techniques for land use change, and pasture development, Develop necessary legislations under the umbrella of MOWI. When it comes to climate change adaptation, the emphasis is mainly on reducing risk and vulnerability while increasing coping strategies at the local level.

Reduce Risks of Agricultural Pests and Diseases:

Assess current state , and threats from latent or controlled diseases, pests and invasive species, Evaluate serious risks, Develop adaptation or intervention strategies; and accordingly promote improved IPM practices and procedures,

Introduce Agricultural Insurance System:

Development of improved agricultural insurance and other financial instruments for risk management, including Climate Change Adaptation Fund Develop incentive programs for farmer that adapt measures that reduce emissions according to advised technologies

Reinforce Early Warning System for Drought Monitoring (Using Climate, Vegetation Cover, Water budget, and Crop Risk information)

Integrated National Efforts for empowering the Drought Monitoring Unit / at NCARE is needed as the National Center for Drought Early Warning System, in collaboration with the Jordan Meteorological Department, MOWI, MOA, & MOE, Building Database, Building Capacity of Research and Extension by Installing an early warning system that provides information in real time to farmers on erratic rainfall distribution and droughts resulting from climate change and assisting the farming communities become resilient to face different weather

patterns, the system will also assist in developing monitoring techniques, dissemination and awareness of climate change and related Drought Risk Management.

Project 2.2: Using ICT as an enabling tool for more effective climate change adaptation and development programmes

ICTs encompass the full range of technologies, including traditional and emerging devices such as community radio, television, mobile phones, computer and network hardware and software, the internet, satellite systems, and podcasting.

ICTs are enabling tools that can increase the effectiveness and efficiency of development programmes. If integrated strategically, ICTs – including community radio, knowledge centres, mobile phones and interactive media– can contribute tangibly to climate change mitigation and adaptation efforts. Therefore, use of ICTs as tools embedded within existing development programmes makes these interventions more efficient and effective (e.g., offering increased access to market information through a mobile phone to increase income; ICTs are therefore considered a catalyst for change within development sectors such as education (e.g., distance learning, e-learning), health (e.g., e-health, mobile health, telemedicine), governance (e.g., empowering citizens through increasing participation and inclusion in decision-making processes; more accountability/transparency through access to information) and rural development (e.g., access to market information). A multi-stakeholder partnership approach is necessary for effective ICT implementation and up-scaling.

Concrete Climate Change Adaptation Activities:

- Capacity building through e-learning as vertical learning and knowledge sharing as horizontal peer-to-peer learning tools.
- Raising awareness at the grassroots level (e.g., media campaigns) at all levels of the targeted society – including the farming communities and poverty pockets – about the effects of climate change.
- Enabling access to relevant information and locally applicable knowledge.
- Facilitating learning and practical knowledge sharing.
- Empowering the poor and marginalized communities to raise their voice for political accountability and meaningful action and engagement in the decision making policies and decisions that impact their livelihoods**.**
- Inform farmers of the current problems with irrigation (water quality and quantity).
- Provide people with innovative early-warning and alert systems that are enhanced through ICTs to reach more people and therefore save lives
- Enforce Groundwater Control Bylaw (No. 85) FY 2002 – continue to enforce ground-water basin extraction limits.
- Re-structure irrigation and pumping tariffs to reflect, at a minimum, the full cost of delivery of government-supplied surface and ground waters.
- Eliminate free pumping from private agriculture wells.
- Reform wholesale agricultural markets.
- Facilitate formation of water users' associations and examine benefits of variable water right trading.
- Increase public awareness and train people of different ages and social statuses on water saving and sanitation methods.
- Documentation of traditional knowledge of local community on soil and water conservation to understand their climate change adaptation history to harsh physical conditions in dry seasons.
- Carry out studies to estimate and design for mitigation of the impacts of hydrological disasters such as flash floods and thunderstorms.
- Introduce policy measures to ensure the equity in access to water shares and rights.

Project 2.3 Jordan Valley Water Sustainability and Agribusiness Competitiveness

Background: Water is a primary commodity which directly impacts small farmers competitiveness and agribusiness processors throughout the country and which has a significant effect in the country's ability to realize sustainable and socially-shared economic growth. Furthermore, water is closely linked to food, energy and urban development. Yet, the collision of massive economic and demographic pressures with climate and environmental forces is leading to a crisis like none before. The declining water supply in the country is in great part due to a lack of a clear and efficient regulatory system for water and lack of coordination on foundational factors for competitiveness of the agribusiness sector. Current arrangements to provide water to farmers are unsustainable because they are jockeyed with governance issues. Petty corruption, weak or biased enforcement of illegal practices, unclear incentives systems, undependable service delivery, thorny policy making, lack of funding for innovations and mismanagement of resources are some of the issues which thrive in the absence of a market-based commercial mechanism and market control for water. Finding collaborative solutions to Jordan's water crisis is essential to ensuring the sector's ability to realize its growth potential.

Objectives:

This proposed project aims to support a participatory process, whereby Jordan Valley agribusiness sector stakeholders identify the most critical issues facing the regional agribusiness sector, and jointly design and produce realistic and implementable solutions to achieve an effective integrated water resources and agribusiness management system in the Valley. Resulting public, public-private and private actions are expected to bring in new and "sustainable" investments and jobs into the agribusiness sector in the Jordan Valley.

In the face of the acute water insufficiencies in the Jordan Valley, there is a need to coordinate between public and private sector actors to ensure effective water resources management and sustainability, and enable agribusiness enterprises to expand, compete and attract investment. In this pursuit, a number of actors of the water sector in Jordan, including the Ministry of Water and Irrigation, the Ministry of Agriculture, the Jordan Valley Authority, the Agricultural Credit Corporation, Water Usage Associations (WUAs) and individual farmers, are reaching consensus on the value of a multi-stakeholder engagement initiative around water in the Jordan Valley. The World Bank Institute (WBI)'s Private Sector Engagement For Good Governance (PSGG) program under the Jordan Valley Water Forum (JVWF) where the WBI brokered a stakeholder participatory process for reforms to achieve a truly effective integrated water resources and agribusiness management system in the Jordan Valley.

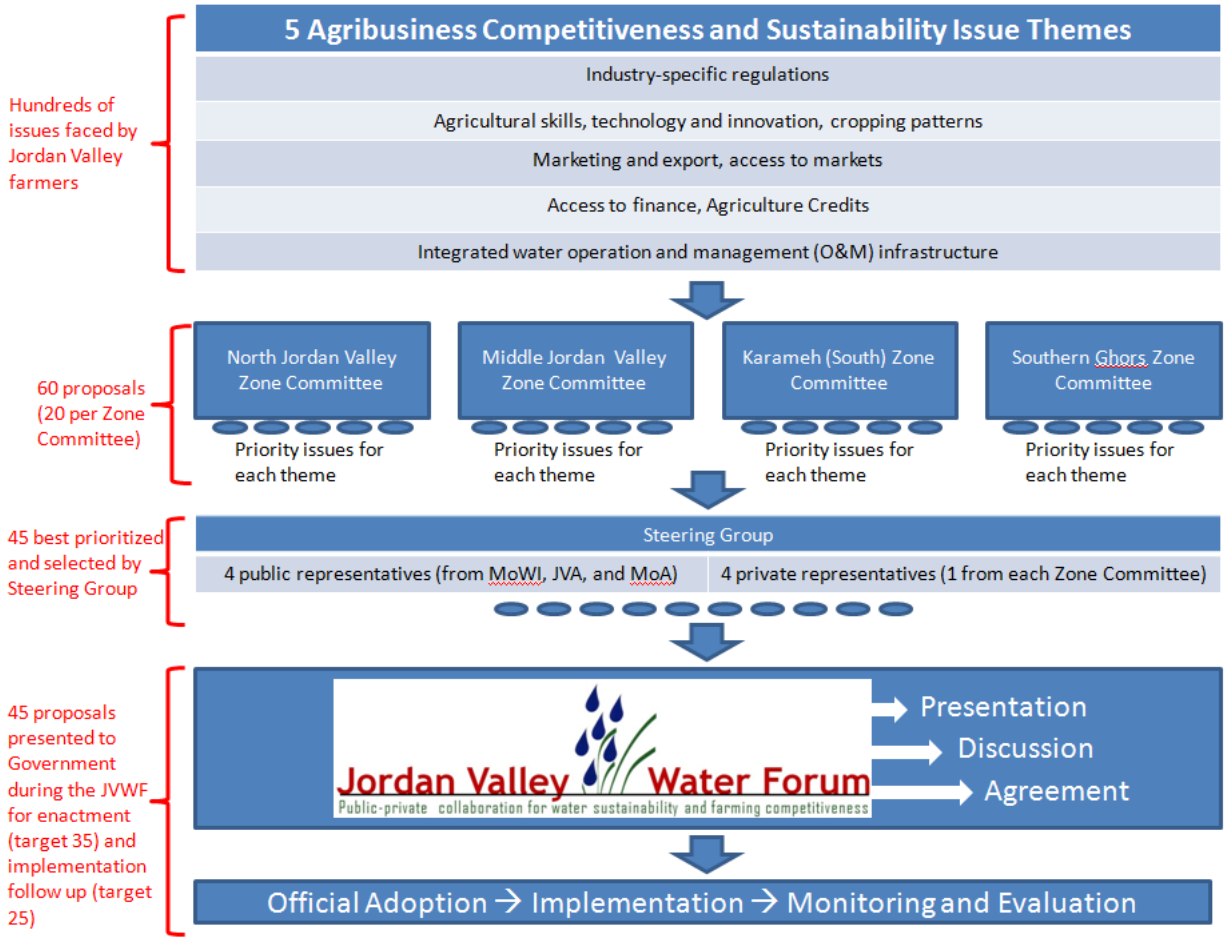


Figure (2.3.1): Jordan Valley Water Forum Structure

This project which has held numerous stakeholder meetings and two JV Water Forums will help sustain this engagement and enable concrete results along the five themes already selected by the stakeholders:

- Industry-specific regulations
- Agricultural skills, technology and innovation, cropping patterns
- Marketing and export, access to markets
- Access to finance, Agriculture Credits
- Integrated water operation and management (O&M) infrastructure

Phase I: Securing buy-in, setting up a Multi-Stakeholder Engagement Process

Support for the multi-stakeholder process:

In a fragile context, with high social and environmental stakes, the government's ideas to impose new crop patterns or top-down solutions that do not fit business needs are likely to clash with the realities and ideas of communities who are suffering from existing weak water governance. In the tense Arab Spring climate, appropriate solutions to water conservation, distribution and even commercialization could only be envisaged without the risk of social flare-up if a multi-stakeholder approach is applied. Such an approach needs to focus on the inclusion of the relevant stakeholders in the policy-making process, in order for those stakeholders to collaborate to enhance the environment for agribusiness competitiveness, fairness in the distribution of water, and accountability through the establishment of clear actions on regulation, skills, financing, innovation, and infrastructure. The PSGG team, in collaboration with other IFC and World Bank teams, started by engaging on the ground with all key local stakeholders in Jordan in 2012, mapping their programs and activities and identifying gaps that needed to be filled, especially those gaps where there was strong potential for furthering the existing donor efforts. The PSGG program helped set up a multi-stakeholder process that empowers actors to collaborate in order to achieve the necessary results.

The launch of the Jordan Valley Water Forum (JVWF)

The launch of the Jordan Valley Water Forum (JVWF) on June 11, 2012 provided an opportunity to hear from individual farmers, business groups, zone representatives, water experts and public sector leadership from the relevant ministries. The Forum was structured in order to provide significant time for five Thematic Working Groups to compile and prioritize the critical water issues within the theme, and provide realistic recommendations for the public sector to consider.

The Jordan Valley Water Forum was then solidified as a continuous process with a Steering Committee with four public and four private representatives. It is chaired by the Secretary General of the Jordan Valley Authority, and composed of the Minister of Water and Irrigation, the Minister of Agriculture, the Head of the Agriculture Credit Corporation and four elected Jordan Valley regional representatives of the 23 Water Usage Associations (WUAs) that represent farmers, so they can voice concerns in a coordinated manner and discuss specific issues and recommendations.

Identification of priority recommendations: The first set of priority recommendations were selected and prioritized of recommendations based on both selection criteria such as the potential to improve the sector for the most farmers possible and the public sector's ability to realistically implement related activities.

1. Creation of an Ad hoc committee to change the mechanism for establishing and utilizing processing facilities and central markets.
2. Provide a government guarantee of airfreight space for produce exports on regular flights for a transition period of three years.
3. The expansion and support of an “Agricultural Risk Management Fund”.(MOA)
4. Increased technical assistance through the MoA Extension Services focused on implementing more sustainable and productive crop selections.
5. Amending the JVDL through the addition of articles (A and B) in Forum Proceedings.
6. Establishment of an independent technical committee to identify opportunities for studying and implementing irrigation network rehabilitation correctly.
7. Recruitment of new technically trained staff for O&M in order to provide enhanced water distribution services and increase irrigation network efficiency.
8. Installation of innovative filtration systems at the bulk water level to remove impurities present in the local irrigation water.

9. Support for farm level water harvesting to improve efficiency and lower demand on bulk water supply: Can be performed through ACC or MoA support.
10. Implement protection measures along the KAC to prevent pollution from local activities.
11. Enact legislation and penalties to control the illegal drilling of wells (already existing at WAJ) as the Ground Water Monitoring by-law
12. Deployment of advanced innovative irrigation methods such as drip, spray and micro-sprinkler irrigation.

For Phase I, there are no funding requirements as this phase is basically completed through the World bank Institute (WBI), but funding is sought for Phase II and III.

Phase II: Establishment consensual policy reform proposals

Sustaining the participatory process

The impact of such proposed measures should not only be considered in economic terms (better yields, better exports, further investment, more jobs) but also in term of inclusive growth and collaborative governance practices. Therefore the established participatory process needs to be maintained, through a coordinated secretariat, with donor input to ensure good practice in the dialogue process.

Feasibility studies for reform proposal

The project will provide funding for feasibility studies or key sourcing of information necessary to justify reform proposals.

Establishing consensus around policy reform proposals (selection criteria)

The selection criteria for any given reform proposal submitted to the Jordan Valley Water Forum will be standardized to ensure that issues and

recommendations can be compared against each other. The selection criteria for recommendations are:

- Clearly linked to specific outcome targets in terms of improvement of a development indicator;
- Clearly targeted at quantifiable impact results in terms of agricultural productivity / investment generation / infrastructure development / skills development / access to financing / job creation / etc.
- Fully implementable within six months from enactment;
- Projected to have a cost-benefit ratio above 1:4, considering a) private sector cost and benefits and b) public sector cost and benefits;
- Clearly aligned with the Water for Life Strategy 2022 and Jordan's overall development objectives; and
- Informed by international good practice.

The stakeholders will need to agree to detail the recommendations in a series of actionable steps, (they already are requesting support from development partners to do so). The Minister of Water and Irrigation states that "the Forum has been designed to address the next 10 years for the Jordan Valley water users and beyond. He pledges to "take the farmer recommendations collected during the Forum process, and through cooperation, to implement them via a prioritization exercise. This activity all falls within the JVA plans and strategy." The JVA will host the secretariat and coordinate the work with the Ministries and the private sector and define actions according to a sector competitiveness action matrix:

1) public-public actions e.g. Industry-specific policy and regulatory reforms, specialized tax regime, incentives regime, industrial land programs, institutional streamlining and coordination, etc.

2) public-private actions e.g. PPPs, joint investment, investment promotion, skills partnership between academia and private sector, last mile utility provision, innovation partnerships, etc. and

3) private-private actions e.g. Joint procurement platforms, joint standard setting, private sector-led certification, joint investment and trade promotion projects, joint training, venture capital, etc.

Phase III: Support to reform implementation and monitoring implementation support

This phase works with the stakeholders on the implementation of reforms. Specific activities that will be supported in this phase are as follows:

- Support implementation (program management): the project will define roadmaps and program architecture, i.e. instruments, or pilots feeding priority areas and objectives, sources of funding and indicative budget allocations for actions
- Establish monitoring systems and feedback loops (M&E, Impact Evaluation): The project will define measurable objectives / targets, realistic timeframes, results and outcome indicators, etc. These will allow insight into results and impact of suggested policy interventions with the aim to improve instruments, justify budgets spent and promote its success.
- Monitor progress against action plans
- Provide technical inputs across the reform program: Hands-on technical assistance and capacity building to help implement all reform components.
- Maintain reform momentum through continuous PPD throughout implementation. The process will involve workshops to build understanding of the issues and promotion of reforms.

The expected impact will be reflected in the increased value of investments, sector revenues (including exports) and jobs generated. In the short to medium term, the activity would support implementation driven public-private dialogue establishment, action plan preparation, including a monitoring and evaluation framework and strengthening of the policy reform agenda.

Examples of specific sector impacts are:

- Number of new jobs created
- Better managed water resources resulting in higher yield for agricultural producers throughout the Jordan Valley
- Increased revenues for participating farmers thanks to new crops and better managed resources
- Number of water association groups that become commercial water utilities
- Increased in FDI (as attributed by investors to the Forum process)
- Private Sector savings resulting from reforms advocated by Forum
- Number of new micro-enterprises created linked to the agribusiness industries

In addition to improving governance in Jordan's agribusiness sector, as measured by a standard set of intermediary outcome governance indicators the intervention has also created an environment for testing the efficacy of various engagements tools. As such, the program includes an Impact Evaluation component, where randomization will be used. Six WUAs will be randomly selected for capacity building activities - two in the southern, two in the center, two in the northern regions of Jordan Valley - with provision of different types of services to different WUAs, with a control group that should enable the team to infer attribution and to derive a cost-benefit ratio, which will be used for further regional engagement.

Results expected also include the generation and dissemination of knowledge for how to improve the water sector in MENA countries through collaborative governance. This will be accomplished through collection of south-south engagement, learning from good practice and production of case studies. Creating knowledge from this program could then be used in other projects throughout the MENA region and globally. Such knowledge sharing can create a snow-ball effect for implementing these governance platforms in other countries. Outcomes from the program include better use of sparse water resources, adaptability to climate change, value-add for agribusiness by

producing exports further along the value chain, setting a precedent for open governance and transparency in policy-making activities, enhanced service delivery from government ministries to citizens, and positive shifts in the currently volatile social climate in the MENA region through citizen participation in the policy-making process.

B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and groups within communities, including gender considerations.

For each of the projects under 1.1-1.4 a Criteria will be applied to determine the vulnerability of the target communities that will be governed by the following:

- Climate change vulnerability and desertification mapping generated via research insititutions and the second National Communication on Climate Change as well as the result of studies and reports currently being generated for the third national communication all of which will be used to primarily determine the exent of the vulnerability of the target communities to climate change
- How willing is a community to get organized through (a) local NGO(s)
- Availability of a wastewater treatment plant generating wastewater suitable for the reuse and in compliance with national standard 893/2006 andrain water harvesting potential
- Level of community acceptance for engagement of women and youth in pilot activities
- Linkage between climate change adaptation proposed activities to the National CC Adaptation Policy for 2012-2020 and the National Water and Agriculture Strategies
- How closely linked are the proposed activities to the national Governorates Development Plan and Poverty Irradiation Measures (Poverty Pockets)
- Elements taken into consideration with regards to public outreach on CC Adaptation and the inter-relationship between national efforts and grass root level awareness initiatives.
- Sustainability planning and how does the community plan to maintain the project under consideration once CC Adaptation project funding is completed.
- Willingness of the community to engage in public awareness/education on adaptation to climate change, behaviour change and to set aside funds for Operation and Maintenance (O&M)

Component (1) Projects:

- **(1.1), (1.2) Wastewater reuse as a climate change adaptation tool in the water and agriculture sectors**

Recycled (reclaimed) water project in Wadi Musa have many benefits. It provides water which aid in solving the water problem, produce forages for livestock which aid in the solving the shortage in feedstuff, and contribute in increasing families' income

significantly by more than four times, and no effluent will be discharged to the adjacent valley (wadi) due to full reuse of the effluent, thus improving the environment and contributing to local labor employment. This project is also expected to enhance community resilience and adaptation to climate change through improved and upgraded household generated income of poverty pockets and nomadic local beduin communities at Wadi Mousa by becoming aggressive beekeepers, train selected farmers leaders to become experts on beekeeping production and to disseminate their knowledge to the rest of the community.

This project provides a complete win-win situation: farmers making a profit, and the wasting of treated effluent into the environment is much less than before the irrigation component started. Yields on farmers' fields would increase, as does water productivity, since the reuse of reclaimed water in irrigated agriculture can replace the use of fresh water supplies (as ground water aquifers are already under stress in Jordan due to over abstraction). Irrigated agriculture is foreseen as a vital socioeconomic activity to the country. This project provides an excellent example of how to integrate wastewater treatment with productive agriculture for the achievement of climate change adaptation in both agriculture and water sectors can be replicated not just in Wadi Mousa but in other parts of Jordan such as in the Northern Jordan Valley which is project (2) under the first component. In general, the agricultural sector is subjected to strong competition from other sectors and receives few national or international investments in comparison with other economic activities.

Beekeeping plays a central role in Integrated Development programmes especially in view of the socio-economic point of view that, it can provide employment to all members of the rural family, can be adopted either as part or full-time work, stimulates community spirit and social contact and helps rural people to become self-reliant. It is estimated that each hive can generate about ($150) a year. While from ecological view, beekeeping has a positive effect on the environment; it can have a positive influence on nature specifically on the pollination of cultivated and wild plants. In addition, this activity does not occupy land or even require ownership of land.

Gender Integration and Impacts

The Water Reuse and Rainwater Harvesting Implementation Activities will have an impact on the employment and improved environment for women who reside and work in the vicinity of the Project Implementation Sites. Training will be provided for field workers who will be employed on the farms that will be irrigated with reclaimed water on the safety and hygiene issues related to the project, but also on related health and welfare issues. Since the farm areas will either be newly planted in an area where no farms previously existed, or on existing farming plots, there will be additional employment opportunities generated for both men and women.

As Gender is a crosscutting issue, and among the stakeholders in the projects, the Wadi Musa currently has a discreet community participation component while the Northern Jordan Valley WW Reuse and Ghour Haditha Mazzrah have Water User Associations (who have amongst their members some women farmers. Of the major gender-impact issues the Project is addressing in the context of development of the Wadi Musa farming site are:

1. The extent to which women will be affected by the increased demand for on-farm labor and subsidiary services created as a result of the 1069 dunum farming site and the expansion area.
2. The extent to which women will be affected by intensified production, considering changes in labor requirements, in household cash requirements for agricultural investments, and concomitant changes in women's labor allocation.
3. Encouraging women householders (particularly widows and divorced women supporting families) to participate in the work of the local registered NGO managing the farming & irrigation activities at the project site.
4. As the project develops and expands, involving both male and female community beneficiaries in the design work and in decisions regarding infrastructure design and placement.
5. Exploring most effective means to use treated wastewater to cultivate crops that can have commercial value added through processing of products or by-products, thus

creating employment/income-generating opportunities for women.

6. Provide extensive on-site training to both men and women in the safe handling and use of treated wastewater.

7. Develop public awareness and social marketing tools directed to both men and women related to safety in handling and exposure and utility of wastewater reuse, recognizing that some of the tools may need to be tailored to the specific sub-audience groups.

8. Promote the engagement of female extension agents, and include in their TORs, responsibility for technical issues related to effective and appropriate handling of treated wastewater.

In addition, the project will actively recruiting women professional staff in both technical and administrative roles.

In Jordan Valley around 350, 000 people are the main beneficiaries of irrigated agriculture and women form an important component of the labor force. Foreign labor, mainly from Egypt, is common in irrigated agriculture in Jordan. It is worthy to mention that recurrent drought and climate change conditions facing the Middle Eastern Countries, specifically Jordan, where rural communities are normally the hardest hit especially if they are in a desert and remote locations not served by municipal water supply and collection systems.

(1.3) Community resilience and adaptation to climate change through water harvesting technologies in poverty pockets and local community groups.

Water resources and water balance are expected to be facing negative impacts due to climate change-induced effects, spatially as well as temporally. Therefore water must be used efficiently.

Climate change will affect rainfall and increase evaporation, which will put increasing pressures on our ecosystems services. At the same time, development by a growing population will affect our ecosystems as we increase our demands for services, including reliable and clean water. Rainwater harvesting will continue to be an adaptation strategy

for people living with high rainfall variability, both for domestic supply and to enhance crop, livestock and other forms of agriculture. There are numerous positive benefits for harvesting rainwater. The technology is low cost, highly decentralized empowering individuals and communities to manage their water. It has been used to improve access to water and sanitation at the local level. In agriculture rainwater harvesting has demonstrated the potential of doubling food production by 100% compared to the 10% increase from irrigation. Rainfed agriculture is practiced on 80% of the world's agricultural land area, and generates 65-70% of the world's staple foods. For instance in Africa more than 95% of the farmland is rainfed, almost 90% in Latin America. Currently only 5% of rainwater in Jordan is used as 85% is lost through evapo-transpiration and 10% is lost through runoff.

The Fourth Assessment Report of the IPCC itself indicated that the expanded use of rainwater harvesting and other "bottom-up" technologies have the potential of reducing emissions by around 6 Gt CO2 equivalent/ year in 2030 (IPCC, 2007).
Rainwater harvesting systems remove some of the demand for mains water and also release that water for other increasing demands. They reduce the volume of rainwater discharged and hence may contribute to reducing flood risks and the load on sewer systems. In addition, rainwater does not require chemical, physical nor biological treatment before use for most non-potable demands. This makes maintenance of rainwater harvesting systems generally easy and cheap.

Rainwater harvesting is used to improve livelihoods by providing water for domestic purposes; for subsistence and income generation activities such as gardening, and livestock rearing; for environmental purposes, through recharging groundwater and establishing woodlots to reduce deforestation. In essence, it can supply water to accelerate social and economic development, to alleviate poverty and generate income for rural farmers by enhancing the crop yield, modifying the method of production, as well as to promoting environmental conservation.

Most importantly rainwater is the safest of all water sources. Although rainwater can become contaminated through the absorption of atmospheric pollutants, it is usually

clean as it hits the earth, unless there is atmospheric pollution from industry. The challenge with rainwater is to keep the collection surfaces and the storage facilities free from contamination and free from mosquito breeding. Remote arid village in the south of Jordan are in urgent need to get continuous, higher quantity and better quality of water.

(1.4) Effects of Permaculture on Environment and Local Community:

Scientists agree that, as of 2011, we have less than 10 years to radically change human behavior. Permaculture is a new concept implemented in the area, and its impact on the environment and local community is very apparent. The normal practice in the project area is monoculture, where farmers use extensive amounts of fertilizers and pesticides which result in negative impacts on human and environmental health. Permaculture is a design system for sustainable living.

Economically, farmers realize: decreased food purchasing costs, since they are growing a variety of their food; decreased agricultural input costs (i.e. fertilizer and seeds), as they depend more on manure; decreased labour input, as the systems put in place are self-sustaining and require little maintenance; income diversification; and income generation, as in supplementing their food sources they can sell the surplus. Therefore, permaculture plays a vital role in building economic resilience for households by diversifying their livelihood strategies and ability to withstand crises. Environmentally, permaculture brings about soil conservation, as systems are designed to build organic matter and return nutrients to the soil.

Community-based management of rangeland resources were seen as the main adaptation measures that would sustain and increase yield at farm level under the conditions of climate change.

Additionally economic benefits imply that improved and integrated agricultural and water management practices, introduction of new varieties is crucial in improving livelihoods of the rural poor in target areas.

Rural women in particular are responsible for half of the world's food production and produce between 60-80% of the food in most developing countries. Permanent temperature change will reduce agro-biodiversity, creating potential impacts on food security (IUCN, 2009). Women in developing countries are the principal producers of basic foods and the agricultural sector is very exposed to risks of drought and certain precipitation; this means that climate change endangers food security as well as the wellbeing of families and their capacity to survive.

Component (2): Capacity Building both at the national and local/community levels respectively, knowledge Dissemination, policy and legislation mainstreaming.

Climate Change Adaptation strategies for climate change will be more effective if the availability of resources, the level of living standard of the people, local knowledge for social and economic development and adaptation gender strategies are taken into account. The impact of climate change is expected to affect the gender equality which is important for the comprehension of human rights, sustainable development, poverty eradication and disaster reduction. Positive action in the targeted areas could decrease pressure from climate change.

The term "gender" is used to emphasize that "sex inequality is not caused by the anatomic and physiological differences that characterize men and women, but rather by the unequal and inequitable treatment socially accorded to them. In this sense, gender alludes to the cultural, social, economic and political conditions that are the basis of certain standards, values and behavioural patterns related to genders and their relationship"

Gender inequalities cross with climate risks and vulnerabilities: Women's historic disadvantages – their limited access to resources, restricted rights, and a muted voice in shaping decisions – make them highly vulnerable to climate change. The nature of that vulnerability varies widely, cautioning against generalization. But climate change is likely to magnify existing patterns of gender disadvantage

Climate change affects women and men differently; understanding the risks and different impacts of climate change on men and women is a key in achieving sustainable development. Women are not just victims – they can help in implementing mitigation and adaptation of climate change strategies related to energy and resources use, economic and socio-economic perspectives and policy making. Gender-based violence is also a socio-cultural construct that can create specific risks for women and girls in disaster-related situations.

Health situation: Women have less access to medical services than men, and their workloads increase when they have to spend more time caring for the sick. Women often rely on crop diversity to accommodate climatic variability, but permanent temperature change will reduce agro-biodiversity and traditional medicine options, creating potential impacts on food security and health. An increase in climate-related disease outbreaks will have very different impacts on women than on men.

Access to information, education and communication plays a critical role in determining the effectiveness of early warning systems which are critical in reducing the impact of floods, droughts, hurricanes, tsunamis and other disasters. Women have lower literacy levels, and therefore are less likely to respond to written early warning announcements and instructions; poor education leads to less involvement in decision making and less representation in disaster response organizations and training, hence lowering their capacity to respond to disasters.

The poor (the majority of whom are women) are likely to be physically located in places vulnerable to disaster risks and in poorly built environments. In rural areas, they may be small agricultural farmers living on hillsides and river embankments which are prone to soil erosion, and therefore are at risk of losing their source of livelihood. In urban locations, poor women living and working in marginal areas can also be exposed to technological or human-made risks. Studies show that women, boys and girls are 14 times more likely than men to die during a disaster.

The programme components will address social issues as an integrated concern. Large areas of the range and agricultural lands is expected to deteriorate because of climate change risks with adverse national, regional and global consequences for biodiversity, carbon sequestration and the quality and quantity of water flow.

Significant opportunities exist to address risks by the poorest rural communities located in the poverty pockets and improve their livelihoods and preparedness for climate change. Focus will be placed on the building capacity in participatory and gender-sensitive approaches. As the knowledge of poor people to manage climate change risks affecting their livelihoods, and their food security enhanced, water use efficiency improved, the program will benefit the target population.

(2.3) Jordan Valley Water Sustainability and Agribusiness Competitiveness

This project aims to support a participatory process, whereby Jordan Valley agribusiness sector stakeholders identify the most critical issues facing the regional agribusiness sector, and jointly design and produce realistic and implementable solutions to achieve an effective integrated water resources and agribusiness management system in the Valley. Resulting public, public-private and private actions are expected to bring in new and "sustainable" investments and jobs into the agribusiness sector in the Jordan Valley. Some positive impacts of this project include access to improved and safe drinking water facilities for the majority of the inhabitants in the JRV and other irrigated areas, as well as the expansion of the green cover because the better management of water resources results in higher yields for agricultural producers throughout the Jordan Valley. Additionally there will be increased revenues for participating farmers thanks to new crops and better managed resources and number of water association groups that become commercial water utilities will increase, also there will be number of new micro-enterprises created linked to the agribusiness industries

The launch of the Jordan Valley Water Forum (JVWF) provided an opportunity to hear from individual farmers, business groups, zone representatives, water experts and public sector leadership from the relevant ministries. The Forum was structured in order to

provide significant time for five Thematic Working Groups to compile and prioritize the critical water issues within the theme, and provide realistic recommendations for the public sector to consider

The most vulnerable communities and groups to benefit from this project are: agribusiness producers, farmers, SMEs, water user associations, farm workers, and indirectly population of the Jordan Valley.

C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.

Treated Wastewater Reuse: Using the model of Wadi Mousa Treated WW Reuse Project for extrapolation to the Wadi Mousa Expansion Project and other national TWW Reuse projects, coupled with the information developed in the marketing, economic, financial, and socioeconomic analyses conducted for this study provide a basis for the following cost effectiveness analysis:

- The effluent produced by the 23 WWTPs in Jordan is a valuable resource, provided care is taken in the management of disposal activities to avoid potentially serious public health problems and a detrimental influence on the markets for fruits and vegetables;
- The crops grown by direct irrigation with reclaimed water include fodder, cereals, and tree crops. There is an enormous market for green fodder as an animal feed in Jordan. For example, the present fodder requirements amount to about 830,000 tons annually. The gap must be filled by importing dry hay or substitution with other kinds of feed, such as barley. Pistachio nuts are another market opportunity identified for Wadi Mousa. Jordan presently imports large volumes of pistachios from Syria and Turkey;
- The strategy for marketing crops grown with reclaimed water requires the organization of farmers and other stakeholders into associations to promote their common interests. Public awareness and education programs are critical elements of the strategy. They should be linked to the Demonstration Projects and disseminate

information about the safety of producing and consuming the crops irrigated with reclaimed water, as well as the products from animals that consume feed grown with reclaimed water. The lack of appropriate marketing information and extension services are major constraints in Jordan at both the production and marketing levels. Government and donor support is needed to improve the adequacy and efficiency of these services;

- There is strong economic justification for the use of reclaimed water to irrigate fodder, cereals, and tree crops. The case study conducted at Wadi Musa indicated a benefit/cost ratio of 2.0 from the staged development of facilities to irrigate with available reclaimed water, using a 50-year period of analysis and a discount rate of 3 percent. The internal rate of return, which is useful in comparing economic performance with other opportunities for investment capital, was estimated as 30 percent; If it is assumed that the direct irrigation benefits per cubic meter per day, as measured in the Wadi Mousa Case Study, are representative of the potential benefits for the other WWTPs in Jordan, the value to the national economy in terms of increased net farm income is approximately JD 9.0 million per year at the current level of effluent production;
- The financial analysis conducted for the Wadi Mousa Case Study indicates farming operations using reclaimed water for irrigation will be financially viable, if the farmers receive appropriate extension services and farm credit during the development period. It is recommended that the initial water charges during a 5-year development period, be limited to JD 0.01 per cubic meter, which is the rate established by current national pricing policies. Full cost-of-service rates have been estimated as JD 0.05 per cubic meter, if the current water tariff for reclaimed water, incremental construction costs for the drip irrigation system, annual O&M costs, and replacement costs are included in project costs and associated revenue requirements and water rates. This charge would be less than the tariff for fresh water pumped from groundwater, and is less than the returns to reclaimed water estimated by crop enterprise budgets. Therefore, it is recommended that water charges be gradually adjusted upward after the development period to cost-of-service rates, if national pricing policies permit;

- The socioeconomic assessment indicates substantial income and employment benefits are already being realized from the demonstration project at Wadi Mousa. The initial benefits are from the employment and expenditures associated with the installation of facilities and training programs at the project sites. The ongoing benefits will be generated by the income and employment of participating farmers. In addition to the benefits at the farm level, the increase in milk production is expected to create new opportunities in dairy products processing, such as ghee and Jameed production.
- The development of a much needed regional market for fodder crops is another important benefit stemming from the Wadi Mousa Project. For example, the green fodder production from the farms being developed at the site is estimated to amount to about 6,500 tons per year, with a value of JD 115,600. This exceeds the national average production of 6,300 tons of green fodder.

The socioeconomic impact: Information about the reuse sites, the analysis is intended to provide helpful information for use in planning future reclaimed water projects. The impacts on community groups that would be significantly affected by the project activities are discussed and quantified. The various groups affected by the activities of the project are expected to include:

- Rain fed farmers with small holdings;
- Retired public officials;
- Sheep and goat raisers and herders;
- Agri-businesses involved in the production process in the region;
- Women widows or divorced and supporting families who may become engaged with farming or in small-scale dairy products processing; and
- Camel and horse owners.
- The socioeconomic analysis addresses the following issues:
- Economic implications for participating farmers in Wadi Musa;
- Development of mature markets for green fodder crops; and
- Potential employment effects.

Economic Implications for Participating Farmers

For the Wadi Musa site, the economic implications for participating farmers will be realized when irrigation and crop production begin. During the initial stage of development at the Wadi Musa site, lease holders will begin producing fodder and cereal crops, which will generate income for their households. The income from tree crops will not be realized until the trees mature and begin to produce in a few years.

Development of Regional Market for Fodder Crops

The Ministry of Agriculture reports no green fodder crop production in the Wadi Musa region. In view of the limited water resources available in the Wadi Musa region, it is not surprising the MOA or DOS statistics show no production of fodder crops. It is expected that the development of reclaimed water at the Wadi Musa WWTP will result in a large increase in green fodder production. The annual fodder production from the farms being developed at the site is estimated to amount to about 4,300 tons. Since grazing animals consume fodder crops amounting to about 9 percent of their weight, this production would be enough to feed a minimum of 1,800 heads of sheep and goats all year round.

- The value of the green fodder produced would be about JD 80,500 annually, even without considering the value of the indirect income and employment generated by feeding it to animals grown in the area, or processing animal products.

Potential Employment Effects

- The Wadi Musa Demonstration Project has already created many jobs. At the demonstration site, two agricultural engineers and many temporary laborers are employed. In addition, many temporary laborers are hired to perform irrigation, harvesting, baling, harrowing, and digging activities.
- When the leaseholders at Wadi Musa begin farming, this will create permanent jobs for them, in addition to many temporary jobs for seasonal activities such as land preparation, planting and harvesting. Milk production is expected to increase significantly from the 1,800 head of sheep and goats fed from fodder production,

creating new opportunities in dairy products processing, such as ghee and Jameed production. Since the average flock size is about 20 head per household, a minimum of 90 households in the region will benefit from these opportunities.

- The following socioeconomic issues were identified in personal interviews with a sample of residents during a rapid appraisal session in the Wadi Musa area. An open discussion session was held with the objective of exploring how the local community perceives the use of reclaimed water in agricultural production.

To better estimate the cost effectiveness of the programme, the budget for each project within the programme is shown below.

The total Budget for each component, is: for component (1) JD 5,900,000 and for component (2) is JD 1,900,000,

The Budget estimated for Projects under Component "1"

- Reuse of Treated Wastewater In Wadi Mousa JD:2.1 M,
- The Northern Jordan Valley Wastewater Reuse Project JD1.7 M,
- Rain water harvesting technologies in poverty pockets: JD 1.1 M,
- Building Resilient Food Security Systems through Permaculture projects JD 1 M,

The Budget for projects under Component "2" is **:**

- (2.1) Support for the National Policy Capacity Building Needs for Climate Change Adaptation of Jordan's Agriculture Sector JD 500,000,
- (2.2) [Using ICT as an enabling tool for more effective climate change adaptation and development programmes JD 800,000
- (2.3) Jordan Valley Water Sustainability and Agribusiness Competitiveness JD 600,000.

D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, sector strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

At the United Nations Millennium Summit in September 2000, leaders of 189 states, including Jordan, adopted the Millennium Declaration. This declaration identified a common vision for the future, consisting of eight Millennium Development Goals (MDGs),

set to be achieved by the year 2015 and related to poverty, education, gender equality, maternal and child health, the environment and a global partnership for development.

Jordan attaches great importance to addressing the phenomenon of climate change and combating its effects on health, food security and water resources as a means to address the obstacles to the Millennium Development Goals.

During the last two decades, Jordan has adopted an economic strategy that aims at increasing self-reliance while minimizing the dependence of the Jordanian economy on foreign resources through the implementation of numerous economic programmes. These programmes have focused on restructuring the national economy, enhancing Its openness and substantiating the role of the private sector as a major producer of commodities and services, as well as increasing its global competitive edge while emphasizing the legislative and oversight role of the public sector.

The proportion of population living below the extreme poverty line fell from 6.6% in 1992 to 4% in 2002 and to 2.3% in 2006, it further declined to less than 1% in 2008. This is less than the targeted percentage to be reached by 2015, which is estimated at 3.3%.
Jordan has made significant achievements in combating poverty and hunger not only per the international standard of $1 a day per capita, but also in relation to the national poverty lines. The percentage of population below the abject poverty line was reduced by more than half between 1992 and 2008, from 6.6% to less than 1%. The poverty gap was also reduced and the poor's share of total consumption increased; however, total economic participation rates and female economic participation rate (40.1% and 14.9% respectively) are still below expectation. Also, unemployment rate among youth and women, still pose a major challenge despite recent reductions.

One of the major objectives of the national economy in relation to employment is to Increase the ratio of the economically active population, particularly women's economic involvement and Decrease unemployment rates and increase employment among Jordanians; additionally to encourage entrepreneurship and privately owned businesses.

The proposed project / programme is also relevant to ESPP programs including the Enhanced Productivity Centers (EPC) program, Community Empowerment Program in Poverty Pockets, Small and Micro-finance Program, and Direct Interventions.

A study conducted on Climate Change Effects on Socio-Economic Factors in Jordan and prepared by Prof. Mohammad Samir El-Habbab recommended the following:
Government can attempt to increase the resilience of growth strategies through implementing effective adaptation policies to both short-term and long-term impacts of climate on their economies; Climate issues should be mainstreamed into national economic planning and budgetary processes; Climate adaptation activities should be integrated in the budget framework of the development projects; Effective adaptation strategies are facilitated by responsive and accountable public institutions; since the early 1995s, harvesting of rainwater has become a government strategy for water Sector development in most parts of Jordan, and the construction of rainwater harvesting cisterns has been extensively implemented to deal with the serious situation of water scarcity.

The water strategy dedicated measures for addressing climate change impacts envisions that by 2022, Jordan will have: Preparedness and adaptation to challenges triggered by climate change impacts as well as a better understanding, preparedness and planning for the impact of climate change on water resources. The increase in demand is significantly noticed in urbanized areas.

Under the MDG 7 which is to Ensure Environmental Sustainability, Target3 aims to halve the proportion of people without sustainable access to safe drinking water and sanitation, Jordan has worked to halve the proportion of population without access to improved water services, and has increased the proportion of those with access to sanitation services to 70%.

According to the 2009 National Agriculture Strategy, the main priorities for Agricultural Development into the next phase are to:

- Intensify water harvesting in various regions, especially the pastoral areas

- Use of non-conventional water resources in agricultural production (forage production and the development of forestry resources).

The specific goals of the Agricultural Strategy are these:

- The completion of the agricultural land survey and soil classification in order to classify their use, and an integrated natural resources management approach (land and water) to maintain resources integrity and sustainability.
- To maintain environmental and natural resources safety and improve natural resources.
- Development and protection of forest and grazing resources, and the increase of productivity of pastoral areas through:
    - Production of (5) million forest seedlings.
    - Afforestation of (3500) dunums of land in the Kingdom and the cultivation of 100 km roadside trees.
    - Establishment of (16) Oasis in the Kingdom's various sites.
    - Reforestation of land surrounding Dams (1000) dunums in the Kingdom's various sites.
    - Maintenance and protection of (1,300,000) dunums of forest land.
    - The protection and development of 10 million dunums of pastureland.
    - Establishment of water harvesting techniques in the pastoral areas with a capacity of (900 thousand) cubic meters.
    - Activation of the legislation on the protection of forest and pastoral Resources.

Furthermore the Water Strategy for Jordan (2008-2022) dedicated other Adaptation measures for Addressing Climate Change Impacts, of these the following are the most relevant to our proposition: First, to utilize alternative water resources that are not readily

available and suitable for direct use as treated wastewater & rainwater harvesting. Secondly, institutional capacity-building, education and public awareness related to climate change impacts and their effect on the social, economic and environmental development of the Kingdom.

Jordan's MDGs and the recommendations of the National Self Assessment Report to UNFCC also highlighted the importance of wastewater as an adaptation tool to climate change and as a means for "Enhanced Integrated Water Resources Management" This proposed reuse component will focus upon: Optimization of Water Resources Availability and Use; Improved Environmental Protection; Laws, Guidelines and Procedures Introduced/Revised to Ensure Greater Water Efficiency; Water Reuse and Management; and Selected Water Management Institutions Functioning Effectively all of which come under the umbrella of Climate Change Adaptation tools and community resilience methods.

And so Reuse of treated wastewater is an essential element of Jordan's water strategy. Within the increasing limitations of available water resources, treated wastewater should be the most important source of water in irrigation in the near future.

GIZ is also extremely active in the water sector in Jordan. GIZ was the lead donor working at the interface between farmers in the Jordan Valley and the JVA, and thus on the creation of the WUAs. The WUAs are currently at various stages of development. However, many of the WUAs have active Task Transfer Agreements with the JVA and operate as quasi-independent water management utilities for their specific water user members. This is a remarkable achievement, and farmers throughout the Jordan Valley have noted enhanced delivery of water services since the creation of the WUAs. These WUAs also act as the primary focal point for water users in the Jordan Valley to voice their concerns to government. The creation and capacity building activities in the WUAs have created a more sustainable participatory approach for water resources management in the Jordan Valley.

If we refer to project (5) under component 1 we find that the project is fully aligned with the strategic objectives of the CMU as described in the Jordan CPS, in terms of inclusive growth and environmental sustainability. The team is receiving support from the CMU

and has built a good relationship with the country and sector teams. The proposed project is also aligned with other ongoing WBG competitiveness and innovation focused initiatives in Jordan, including the Development Policy Review (DPR), WB mini-Investment Climate Assessment (mini-ICA), Development Policy Loan (DPL) series, Innovation Strategy, partnership for Competitiveness TA and Education for Employment (E4E). The Minister of Water and Irrigation states that "the Jordan Valley water Forum (JVWF) has been designed to address the next 10 years for the Jordan Valley water users and beyond.

The national agriculture strategy focuses on continued improvement in the business climate for increased private sector investment, supporting access to finance, access to markets, the development of clusters of services and skills to raising the productivity of farmers and agribusiness SMEs. A major focus of the government strategy policy is also the sustainable use of water resources in a context where Jordan is confronted to an unprecedented water crisis.

E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc.

The Jordanian Institute of Standards and Metrology (JISM) is the national body for standards & metrology in Jordan. Generally the proposed projects will diffidently ensure compliance with national technical standards, as despite the water scarcity in Jordan its quality undergoes rigorous testing and monitoring. The water is tested both prior and during pumping, to ensure that the water is safe for use. Such testing ensures that drinking water in Jordan as well as treated wastewater used for irrigation purposes complies with respective requirements. Several policies were developed by the water strategy among these were the Irrigation Water policy: which addresses irrigation water including agricultural use, resource management, technology transfer, water quality, and efficiency. And the Wastewater Management policy: which addresses the management of wastewater as a water resource including development, management, collection and treatment, reuse, and standards &

regulations as **Jordanian Standard for Industrial Reclaimed Wastewater (202/2007),** this standard states that:

- Treated wastewater and sludge arising from wastewater treatment unit are reused whenever appropriate,
- All plants shall satisfy the relevant requirements according to the end use of water.

For Industrial Wastewater Disposal:

- If this water will be connected to public sewer network, then (Law18/1998) must be followed.
- Recycling or irrigation, discharge to wadis (depending on use).
- Transportation by tankers for disposal in
- Specified sites.

This standard also discusses irrigation of fruit trees & green landscape; cooked vegetables & parks; field & industrial crops; flowers. According to these standards some parameters must be analyzed such as physical and chemical parameters, heavy metals are also of concern as these substances may cause negative impacts and cannot be reduced in normal conditions.Microbiological Parameters: E. coli, and IPN.

Industrial wastewater effluent is sampled by WAJ and MOE who coordinate together in order to avoid duplication of sampling. Any plant which treats wastewater has to do sampling and analyzing for the effluent and keep the record. Time of sampling and frequency depends on the type of industry and the rate of flow. Furthermore the **Jordanian Standard for Reclaimed Domestic Wastewater (893/2006)** determines national regulation, requirements and specification for domestic wastewater and its end use. **Reclaimed wastewater divided into two category:**

- To Wadi
- For reuse:

- Irrigation (four categories): fruit trees & green landscape; cooked vegetables & parks; field & industrial crops; flowers.
- Groundwater recharging (not for drinking)*.

For using surface water Jordan follows the FAO guidelines, WHO guidelines and the GIZ guidelines for Ghour Area. It is clearly stated in the (Water Strategy 2008-2022) that all treated wastewater will be used for irrigation whenever safely possible while ensuring that health standards for farm workers as well as consumers are reinforced. It is also mentioned that for every new wastewater project, an environmental impact assessment will be conduct. Such a project will only be executed if there will be no negative environmental impacts from the project in particular on groundwater.

To ensure compliance the relevant ministries conducts Water quality monitoring programs frequently to determine compliance with water quality plans and standards. For example Domestic wastewater treatment plants: 33 samples/ collected once per four months and for Industrial wastewater: 40 samples/collected once per four months.
It should be mentioned that water sample collection, preservation, and analysis followed the “Standard Methods for Examination of Water and Wastewater, Online”.

Standards that will be followed for the rainwater harvesting component.

The country has strong enforcement system that calls for compliance with codes, standards and regulations., So for the efforts to be undertaken under the rainwater harvesting component will have to get the approval from the relevant GOJ entity, here Ministry of water and irrigation represented by the Jordan Valley Authority who would give approval on the chosen locations for the collection system and infrastructure of the check dams and only approved and classified contractors (classified and regulated contractors) are allowed to execute construction and collection systems .

National environmental and public health and safety regulations will be applied and Environmental Impact Assessments may be required for where a determination may be made by the Ministry of Environment is made that a certain project or activity may have a negative impact and needs to be regulated.

F. Describe if there is duplication of project / programme with other funding sources, if any.

In Wadi MOusa: The successes from the pilots implemented in Wadi Mousa and the humble initiatives of the GOJ in rain water harvesting all of which have shown that yields on farmers' fields would increase, as does water productivity providing an excellent example of how to integrate wastewater treatment with productive agriculture for the achievement of climate change adaptation in both agriculture and water sectors all of which encourage complimentarity and moving ahead with fully fledged projects at a larger scale where the successes can be replicated not just in Wadi Mousa but in other parts of Jordan and the region. The proposed wastewater reuse and rainwater harvesting are thus not duplicating other nationally implemented projects or funding programs such as the completed in 2008 USAID sastewater reuse pilot project

Other existing initiatives related to the subject programme under component 1 (projects 1.2, 1.3, and 1.4 all of which are in the Jordan Valley and under the Authority of the Ministry of Water and Irrigation's Jordan Valley Authority (JVA)), and assurance of no duplication of project / programme with other funding sources:

(1. In January 2013, Ministry of Planning and International Cooperation received a grant entitled "Formulation of the Special Climate Change Fund (SCCF) irrigation Technology Pilot Project to face Climate Change Impact in Jordan" funded by the Global Environment Facility (GEF) and managed by the International Fund for Agricultural Development (IFAD). The project will be implemented over three years (2013-2015) with US$ 4.47 million.

The GEF SCCF project general goal is to upscale innovative irrigation technologies to reduce the vulnerability to climate change of the agricultural system in Jordan and particularly from its impact on water resources by testing innovative environmental friendly and water-use efficient technologies. It aims to increase the resilience to climate change impact of Jordan's water system, acknowledged to be a key resource for agricultural production.

The expected outcomes are: identification, implementation and expansion of irrigation technologies in Jordan, training, capacity building and communication, project management to oversight and coordination mechanisms as well as mechanisms to monitor, evaluate, capture and disseminate lessons learned and best practices for sustainable irrigation practices.

The selected technologies according to agreed criteria are: fertigation technology, Burried Diffuser, Solar water pumps, small scale Brackish water Desalination, aquaponics, hydroponics, reuse of gray water and computerized irrigation system.
Donor Lender support to Jordan Valley

(2. In the Northern Jordan Valley the French Development Agency (AFD) has completed a very successful on farm irrigation system which completed in 2010.
(3. The French Development Agency (AFD) is now planning to finance a JV master plan
(4. KFW is currently financing the upgraded/constructed wastewater treatment plants in the northern region of Jordan at Irbid, Shalalah, Dogara where the treated effluent as required by Jordan Valley Authority must meet the highest standards before it is offered for irrigation with no potential adverse impacts to the irrigation systems there or to the farmers and when leaving the WWTP must meet and be in compliance with JS 893/2006 for cooked vegetables (class A).
(5. GIZ is currently support the water and poverty alleviation project which has some activities in the Jordan Valley and the Participative Management of Irrigation water in JV through the establishment of Water User Associations

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

Our experience in Jordan on pilot projects is that they "Help Spread the Message"

The Wadi Mousa WW Reuse Demonstration project has provided the opportunity to increase public awareness about reuse of treated wastewater, and to reassure people that this is safe. The demonstration site is also used to educate agriculture, environment, veterinary and civil engineering students, visitors from schools and universities throughout Jordan. It has welcomed study tours from neighboring countries and from Europe, Asia and North America. The site at Wadi Mousa has seen numerous visitors, both Jordanian and from other countries. The Demonstration project has a design for a proposed new Awareness Center at Wadi Mousa that will strengthen the capacity of Water Authority of Jordan WAJ and others to tell people about wastewater use and its benefits to people limate change adaptation, community resilience and the environment. Continuing the success into the future helps provide support for Government policy towards full utilization of precious wastewater as a supplemental irrigation resource thus combating climate change impacts on the water resources including gender integration, and socio economic enhancement of local communities. A video in collaboration with UNDP was produced entitled **"Making Every Drop Count**" which is available on the Internet at

http://www.waterfair.org/country.spring?country=109 which is an excellent example of how pilot programs can become a model not only for Jordan but the entire region.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations.

(1.1), (1.2) Wastewater reuse as a climate change adaptation tool in the water and agriculture sectors:

For the Wadi Mousa project: On 9th of July 2012 MOPIC held a consultation meeting with Al-Ssad Al-Ahmar Association (a Community Based Cooperative Association) through the Enhanced Productivity Program (EPP) recognized the need to launch a new initiative – Small Grants for Direct Interventions which was meant to provide funding for community based organizations (CBO) to start and run income generating projects. One of the pilot organizations benefiting from the seed funds provided by MOPIC was Al-Assad Al-Ahmar Association, located in Wadi Mousa region. This association requested funds to implement agricultural related project activities relevant to harvesting forages. The project has been implemented with successful activities that enhance the productivity, create new job opportunities and improve the living standards of beneficiaries and utilized wastewater reuse as a water resource for irrigation and adaptation to climate change impacts.

The above consultation meeting was aimed to reach an agreement on a pilot project relevant to Wastewater reuse as a climate change adaptation tool in the water and agriculture sectors. Pls see attached The participants representing a wide spectrum of the community ranging from farmers, females, heads of households, and NGOs, discussed the project concept and recognized the importance of using treated waste water as a climate change adaptation in agriculture in Wadi Mousa region.

(Attached: Al Ssad Al Ahmar Community consultation sign-up sheet and community needs).

.40 low-income families who have had historically the right to rain fed cultivation of the land were consulted in Wadi Musa, especially the ones who will directly benefit from the implementation of this project, among the 40 farmers, 6 women farmers were chosen, Training for the farmers on good agricultural practices, irrigation management and proper handling of reclaimed water used in irrigation will be initiated.

A Water User Association (WUA) which was established in January 2008 at Wadi

Mousa will ultimately take over the responsibilities of managing farming issues following the end of the project when capacity building measures are completed.

For the Rain Water Harvesting project (1.2) the consultation process was part of the Jordan Valley Water Forums held in June 2012 and January 2013 and whose proff of consultation is provided under the list of attendees.

(1.3) Community resilience and adaptation to climate change through water harvesting technologies in poverty pockets and local community groups.

Jordan Valley Authority which is responsible for developing water resources in Jordan valley was one of the first legal entities which were consulted in this project Several Consultations were undertaken in the Poverty Pockets areas among these were representatives from communities in Ghore Al Mazraha/Ghore Hadeetha, outcomes of several meetings with the concerned parties there showed that the community requested to be provided with water permanently for agriculture and livestock, they also asked to drill new wells and manage water resources.

(1.5) Jordan Valley Water Sustainability and Agribusiness Competitiveness

Several stakeholders were consulted for this project among these were the Ministry of Water and Irrigation, the Ministry of Agriculture, the Jordan Valley Authority, the Agricultural Credit Corporation, Water User Associations and individual farmers, all agreed that there is a great value of the multi-stakeholder engagement initiative around water in the Jordan Valley. The World Bank Institute (WBI)'s Private Sector Engagement For Good Governance (PSGG) program brokered a stakeholder participatory process for reforms to achieve a truly effective integrated water resources and agribusiness management system in the Jordan Valley.

The PSGG team, in consultation with public and private sector stakeholders throughout Jordan, has helped to produce a proposal for setting up a Jordan Valley Water Forum.

The Jordan Valley Water Forum was then solidified as a continuous process with a Steering Committee with four public and four private representatives. It is chaired by the

Secretary General of the Jordan Valley Authority, and composed of the Minister of Water and Irrigation, the Minister of Agriculture, the Head of the Agriculture Credit Corporation and four elected Jordan Valley regional representatives of the 23 Water Usage Associations (WUAs) that represent farmers, so they can voice concerns in a coordinated manner and discuss specific issues and recommendations.

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Enhanced service delivery from government ministries, academic institutions to citizens on climate Change

- The generation and dissemination of knowledge for how to enhance the water/ Agricultural sectors capacity to adapt to climate change
- Setting a precedent for open governance and transparency in policy-making activities.

Value-add for agribusiness by producing exports further along the value chain,

According to the Second National Communication reports Jordan has been identified as particularly vulnerable to the impacts of climate change with the water and agriculture resources as being the most vulnerable sectors to climate change. Under the adaptation alternatives, risks to agriculture in the two focus areas through an integrated response will be developed to manage climate change impacts. Our Project component activities will target vulnerable communities in order to support Agribusiness and the agricultural sector adapt to development opportunities through the use of non conventional water resources management , and enhanced agricultural practices. The baseline situation and adaptation alternative per project component are presented below:

Component 1: Climate change adaptation of Agricultural & water Sector through Technology Transfer (The use of Non-conventional water resources (Reuse of wastewater, rainwater harvesting & permaculture).

Outcome 1: Increased water availability and efficient use through wastewater reuse & water harvesting technologies through integrated and efficient use of non conventional water resources through treated wastewater reuse and rain water harvesting and the application and use of efficient irrigation systems and technologies

Baseline:

The NCARE and MWI/JVA are working on augmenting water supplies through water reuse and harvesting in several areas around Jordan, through the construction of water catchments, and ponds. in Ghour Haditha and Mazrraah where farmers rely on rain fed agriculture, and on ground water for irrigation without considering water-harvesting options while at northern Jordan Valley and CTal Mantah they will rely on treated wastewater to augment supplies as a result of water scarcity caused by climate change.

Adaptation alternative:

Aiming at limiting the impact of climate change on water supplies of Jordan by reusing treated wastewater and rainwater harvesting and thereby reducing the consumption of the scarce ground water The project will enhance national agricultural and community resilience to climate change by addressing common water shortages and climate stresses through innovative technology transfer linked to community livelihoods and environmental resources preservation. This will be achieved by providing efficient, simple and cost effective systems and in applying conserving irrigation water resources management practices as key to ensuring that agricultural production can withstand the stresses caused by climate change to farming communities in arid regions who suffer from water scarcity, and food insecurity by the deployment of advanced innovative irrigation methods such as drip, spray and micro-sprinkler irrigation low-cost pumps, low-head drip irrigation kits, tensiometers and other techniques.

The project will support farmers where rainwater harvesting systems and wastewater reuse will target greenhouses and agricultural open farms. These will supply additional water for irrigation, hence increased yields. Depending on the crop, the increase would be up to 2-3 folds the baseline production. In around 10 years, the return on investment will be achieved. Other practices to be promoted by the project include technologies that increase rainwater infiltration and storage in the soil for crop use, and run-off storage for supplemental irrigation using storage structures such as farm ponds, earth dams, water pans and underground tanks.

The introduction of reclaimed wastewater will have other benefits other than supply augmentation, adaptation to climate change, but also reduced application of pesticides and fertilizers, better soil organic matter; and ultimately socioeconomically better quality of life for farmers (reduced cost of agricultural inputs and less contact with harmful pesticides), enhanced quality of agricultural produce, better worker hygiene and better efficiency per unit area.

The initial high investment cost needed for the installation irrigation systems and filtration techniques will be offset by the higher productivity and lower expenditures within 2 or 3 years

Outcome 2: Reduced exposure at national level to climate-related hazards and threats

Baseline:

NCARE and MOA are currently conducting extension activities to support farmers in enhancing their agricultural practices and productivity. Also NCARE and the Department of Meteorology operates a network of weather stations covering most of Jordan that require further support to predict better climate change scenarios and their impact on agriculture and water resources. Further assitanc eis needed to expand their research and extension activities to cover climate change issues, it is in need of additional technical and financial support.

Adaptation alternative:

The project will directly support Jordan in enhancing its capacity to deliver climate-smart technology for enhanced agricultural production. The adaptation alternative will demonstrate substantial quantifiable improvements in agriculture, water, and livelihoods. As a result of irrigation efficiency, water savings are expected to range between 20-30 percent. Similarly, it is estimated that adaptation measures in agriculture introduced under this project will save about 20 percent of agricultural production and farmer incomes. The results of the program components will be developed and disseminated by

means of component 2 , the enhanced extension services and direct training and enhanced awareness to local institutions and farmers. A range of climate-resilient agricultural technologies and methods will be developed and transferred to farmers e.g. drought- and disease-resistant varieties, integrated crop-livestock production systems, conservation agriculture and others.

An early warning system linked to IPM and water resources management as well as good agriculture practices, will enable farmers to be more efficient in terms of inputs usage (chemicals (fertilizers and pesticides) water and labor. Savings may reach more than 30% of the cost of production. The current measures of following an annual cropping calendar is proving to be cost in efficient is and making crops more vulnerable to climate variability and pest outbreaks.

Outcome 3: Raise living standards and resilience to climate change of vulnerable remote poor communities and Bedouins.

The use of reclaimed water for fodder production in the Wadi Mousa project will promote adaptive grazing practices to climate variability and preserve natural rangeland resources and ultimately make remote communities more resilient to climate change.

Baseline:

Remote and Beduin communities rely on rangelands and are the most vulnerable to climate change and desertification, Degradation of rangelands is being observed caused by natural (climate effects, floods, drought, etc.) and man-made (over-grazing, desertification, etc.) factors.

Adaptation alternative:

The project will be the first project to support MOA in addressing climate change effects in the rangeland ecosystems, provide improved soil salinity management techniques, limit erosion and improve water and nutrient efficiency, thereby contributing to adaptation. Rangelands also support reduced NO2 emissions and carbon sequestration, and ultimately improved feed resources.

Component 2: Capacity Building both at the national and local/community levels respectively,) knowledge Dissemination, policy and legislation mainstreaming.

- ***Outcome 1: Mainstreaming new policies and legislations which incorporate Climate change adaptation measures into local and national strategies & plans.*** This will be achieved through policy influence and sharing lessons learned through a knowledge management system, and Climate Change Adaptation Fund Support which will provide an agriculture and disaster insurance for farmers.

Baseline:

Currently, there is a climate change adaptation fund in place for farmers in Jordan but it has not been effective as an insurance scheme applied for agriculture for climate adverse effects and in cases of severe weather conditions or natural disasters, when farmers lose their crop yields. The GOJ, through MOA assess the damages in the field and disburse compensation payments to the farmers based on the estimated assessment of their losses. This process poses a financial burden on the public budget, and is not institutionalized and require capacity building to set forth the financing mechanism and revenue streams as well as funds disposal methods and avoidance of unfair dispersion of funds.

Although Jordan is a signatory to the Kyoto Protocol, aware of the importance of an enhanced response to climate change, yet there is still an absence of a national climate change policy with inter-connected action plans. The public at large are aware of the increasing climatic vulnerability affecting their environment and community livelihoods, a lot is yet to be done to link the global aspects of climate change at the national level. There is also a need for linkage between sectoral and development implications of climate change where adaptation measures are not mainstreamed into development planning processes coupled with weak Information and lessons learned documentation to influence policy determinations.

Adaptation alternative:

The project support to MOA's climate change adaptation fund and the climate change monitoring system will relate weather indeces and consequence to climate change impacts on crop failures to farmers and community resilience. This process removes the compensation payments from the Government and supports better assessments of damages in the field

The project outcomes will be strongly linked to a strong learning public awareness and knowledge management and dissemination component translates lessons learned into policy implementation and institutional development measures ultimately leading to better adaptation to climate change, a more robust agribusiness supported with ICT linkages and knowledge management systems that are be institutionalized and linked to relevant Governmental and research institutions documenting the experiences of communities and disseminating lessons learned and best practices.

Stakeholder consultations revealed that communities in the proposed project locations understand and feel the climate change impacts, The farming communities are actually asking the government to support them with adaptation projects in the agriculture sector to safeguard their livelihoods. Women were particularly amongst the highest impacted social groups. GOJ wants to ensure that gender mainstreaming is a key element as well as civil society, the private sector and the research organizations are all taking part in this project to ensure an all inclusive approach to climate change adaptation and development and sustainability.

J. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project.

Sustainability Relevant to component "1" (1.1, 1.2)

To sustain irrigated agriculture in the future requires that the farmers' skills and knowledge be significantly improved through knowledge of safe irrigation methods. That's why part of these project activities is to initiate farmers on good agricultural

practices, irrigation management and proper handling of reclaimed water used in irrigation.

Furthermore a Water User Association (WUA) which was established in January 2008 at Wadi Mousa will ultimately take over the responsibilities of managing farming issues following the end of the project when capacity building measures are completed. Additionally, the establishment of a revolving fund will assist farmers in improving and expanding their farming practices in the future.

The sustainability of the participatory process is not only considered by economic terms i.e.(better yields, better exports, further investment, more jobs) but also in term of inclusive growth and collaborative governance practices. Therefore the established participatory process needs to be maintained, through a coordinated secretariat, with donor input to ensure good practice in the dialogue process.

Project **(1.4)** The JV Permaculture is expected to play a role in diversifying production patterns for plants and animal in order to improve product marketing and increase the return from the farm. The project will launch a revolving fund to help the local community to implement small agricultural projects with a focus on Permaculture. The revolving fund is expected to have a great impact in helping the local community to implement and sustain Permaculture practices in their household gardens.

The revolving fund to be developed under project 1.4. will be established. However the details about the number of revolving loans that will be granted, in addition to other information as the pay back period allowed and the requirements needed will be discussed with "Agriculture Credit Corporation (ACC)" through Ministry of Agriculture. It is worthy to mention that the Agricultural Credit Corporation (ACC) is the sole institutional source of formal credit to both individual farmers and members of village cooperative societies.

The farm will cultivate different productive crops which will be used to generate income for the local community. At the household level, different crops will be cultivated to provide supplemental food for the families. Families will not use chemicals for plant protection or fertilizers for soil improvement instead they will depend on safe methods and materials for plant protection and organic manure, and compost and plant residue for soil improvements.

Overall Project/ Program Sustainability

Degree of Sustainability of Reuse, Rainwater harvesting & perma-culture Activities

At the end of a given project, sustainable management plans should be in place for all reuse and rainwater harvesting implementation activities that address issues related to the sustainability

Technical Sustainability

The infrastructure that supports the irrigation system must be robust and able to withstand a high degree of wear and tear. It must be capable of being operated and maintained using local resources, and personnel have an effective program of asset management to ensure periodic maintenance and replacement of parts, and have access to equipment and spare parts necessary for regular maintenance and repair. The design of the infrastructure must be consistent with locally available materials so that in the event of breakdown the system can be repaired speedily and at the lowest possible cost. A technical O&M manual in Arabic will be made available at each site, along with appropriate training and certification of operators, so that members of the enterprise are fully able to follow standard operating procedures.

Financial Sustainability

The enterprises must be ultimately self-financing and do not rely on capital or operating subsidies. Income generation must be sufficient to cover both recurrent and capital expenditures. There must be an effective financial plan that estimates likely income and expenditure streams, management of financial and capital assets, and mechanisms for determining the timing and scale of future investments. There will be a transparent mechanism to audit receipts and expenditures of either a formal or informal banking account system so that it is accountable to its constituents.

Alignment of Project Objectives/Outcomes with Adaptation Fund Results Framework

Project Objective(s)[1]	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
Component 1: Climate change adaptation of Agricultural & water Sector through Technology Transfer (*The use of Non-conventional water resources (Reuse of treated wastewater, rainwater harvesting & Permaculture)*.				
▪ To Increase adaptation to climate change through providing a unique, efficient, simple and cost effective systems to people in arid regions who suffer from water scarcity.	➢ Quantity (m3) of Supplementary water available for agriculture as a result of wastewater reuse & rainwater harvesting.	**Outcome 4:** Increased adaptive capacity within relevant development and natural resource sectors.	**4.1**. Development sectors' services responsive to evolving needs from changing and variable climate **4.2**. Physical infrastructure improved to withstand climate change and variability-induced stress	**4,100,000**
▪ Increasing resilience of Poverty Pockets communities through building sustainable food security systems.	➢ Amount of Vegetable produced in (Kg / Year)	**Outcome 5**: Increased ecosystem resilience in response to climate change and variability-induced stress	**5**. Ecosystem services and natural assets maintained or improved under climate change and variability-induced stress	**1,800,000**
		Outcome 6: Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	**6.1** Percentage of households and communities having more secure (increased) access to livelihood assets	
			6.2. Percentage of targeted population with sustained climate-resilient livelihoods	
Component 2: Capacity Building at both the national and local/community levels respectively, knowledge Dissemination, policy and legislation mainstreaming.				

[1] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

▪ Strengthened ability of remote poor communities to make informed decisions about climate change-driven hazards affecting their specific locations	- Number of community outreach, workshops, training events, seminars, conferences, etc. - Number of entities receiving advisory on Climate Change adaptation or farmers benefiting from better knowledge services on climate change adaptation.	**Outcome 3:** Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	**3.1**. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses **3.2**. Modification in behavior of targeted population	**800,000**
▪ Reinforce Early Warning System for Drought (Using Climate, Vegetation Cover, Water budget, and Crop Risk information)	➢ Number of communities covered by improved warning system and weather information	**Outcome 1:** Reduced exposure at national level to climate-related hazards and threats	**1.** Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	**800,000**
▪ Mainstreaming new policies and legislations which incorporate Climate change adaptation measures into local and national strategies & plans	➢ Number of standards, policies reviewed & amended in support of climate change adaptation.	**Outcome 2:** Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental **Outcome 7:** Improved policies and regulations that promote and enforce resilience measures	**2.1.** No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks **2.2**. Number of people with reduced risk to extreme weather events **7.** Climate change priorities are integrated into national development strategy	**300,000**

Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)**
Increased water availability and efficient use through wastewater reuse & water harvesting technologies	Quantity (m^3) of Supplementary water available for agriculture as a result of wastewater reuse & rainwater harvesting in wadi Musa & Northern Jordan Valley. Amount of Vegetable produced in (Kg / Year)	***Output 1:*** Risk and vulnerability assessments conducted and updated at a national level ***Output 2.1***: Strengthened capacity of national and regional centres and networks to respond rapidly to extreme weather events ***Output 4:*** Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	**1.1**. No. and type of projects that conduct and update risk and vulnerability assessments **1.2** Development of early warning systems **2.1.1**. No. of staff trained to respond to, and mitigate impacts of, climate-related events **4.1.1**. No. and type of health or social infrastructure developed or modified to respond to new conditions resulting from climate variability and change (by type) **4.1.2.** No. of physical assets strengthened or constructed to withstand conditions resulting from	

			climate variability and	
- Raise living standards of vulnerable remote poor communities.	Number of poor smallholder households whose livelihoods from agriculture has been increased. Number of new micro-enterprises created linked to the agribusiness industries.	***Output 6:*** Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	**6.1.1**.No. and type of adaptation assets (physical as well as knowledge) created in support of individual- or community-livelihood strategies **6.1.2**. Type of income sources for households generated under climate change scenario	
- Better Informed society & highly aware communities with ability to adapt to climate change impacts.	Percentage (%) of targeted population aware of predicted adverse impacts of climate change	***Output 3***: Targeted population groups participating in adaptation and risk reduction awareness activities	**3.1.1** No. and type of risk reduction actions or strategies introduced at local level **3.1.2** No. of news outlets in the local press and media that have covered the topic	
- Setting a precedent for open governance and transparency in policy-making activities.	- Number of laws & regulations amended in support of climate change adaptation	***Output 7***: Improved integration of climate-resilience strategies into country development plans	**7.1**. No., type, and sector of policies introduced or adjusted to address climate change risks **7.2**. No. or targeted development strategies with incorporated climate change priorities enforced	

The project implementation

The Ministry of Planning and International Cooperation (MOPIC) is the entity responsible for the overall Implementation where it will house the Program Management Unit (PMU), within the Economic and Social Productivity Programs Unit (ESPP) this unit will have a crucial coordinating role in linking the key players.

All the projects under both components will be executed by a Field Satellite Management Units (FSMU) which includes implementation partners from the relevant organizations, ministries, research institutions, NGOs etc. Each FSMU entity will manage & execute the project according to its mandate, role and professional expertise. These institutions will include but not limited to (Ministry of Water and Irrigation (MWI), Ministry of Agriculture (MoA), Ministry of Environment (MoENV), Jordan Valley Authority (JVA), National Center for Agricultural Research and Extension (NCARE),Royal Scientific Society (RSS), Jordan Food and Drug Administration (JFDA) , Water Users Associations (WUA) and the Hashemite Fund for Development of Jordan Badia (HFBD).

The proposed project / programme emphasizes major goals of the Economic and Social Productivity Programs Unit (ESPP) to enhance the productivity of poor people and improve living standards of local communities and residences specially those living in poverty pockets and this will eventually lead to Increased ecosystem resilience in response to climate change and variability-induced stress.

ESPP has the accessibility to the most vulnerable people through 32 poverty pockets that updated recently and design programs to alleviate poverty in such regions.
ESPP annual budget exceeds US$ 20 million. Government of Jordan will allocate US$ 100 million during the implementation period of the proposed project (five years).

Co-financing will be provided by the Government and parallel projects for a total amount of US$100 million through the ESPP contribution which will include allocation of US$ 100 million during the implementation period of the proposed project for the forthcoming five years. ESPP is guided by a Steering Committee (SC), chaired by H.E Prime Minister and

includes Ministers of relevant entities and Private Sector. The SC of the ESPP set the general policy of ESPP, provides strategic guidance and oversight for the unit, advice on corrective measures, provide conflict resolution. So, ESPP has the necessary autonomously for optimal coordination, management and sustainability of its programs.

Moreover, ESPP meets the criteria necessary to house the proposed Program Management Unit (PMU). The Government of Jordan's commitment to ESPP, the flexibility and the accountability of ESPP are highly valuable essentials for project implementation. For the project to be successful, it is crucial that the PMU is able to operate in a flexible and transparent manner, as well as to attract competitively recruited eminent staff with project management experience and ToRs acceptable to the donor. At each phase of project implementation, the performance of the PMU within ESPP will be closely monitored, and ESPP will establish the PMU and process essential procurement contracts prior to project effectiveness.

A Program Management Unit (PMU) will be established to coordinate the activities of all implementing agencies. The PMU will be guided by a National Committee (NSC), to be chaired by the Secretary General of the MOPIC. A Technical Committee, chaired by the PMU Manager whose mandate will be to provide technical guidance in implementation and M&E activities. The composition of these committees is detailed below.

Project components will be implemented as follows:
- Component 1 will be implemented by MoA, MWI, JVA, NCARE, HFBD, WUAs.
- Component 2 will be implemented by MoENV, MWI, MoA, JFDA, and RSS.

The PMU, will comprise a Project Manager; Monitoring and Evaluation (M&E), Training, procurement and Financial Management Specialists; and Administrative Assistant.

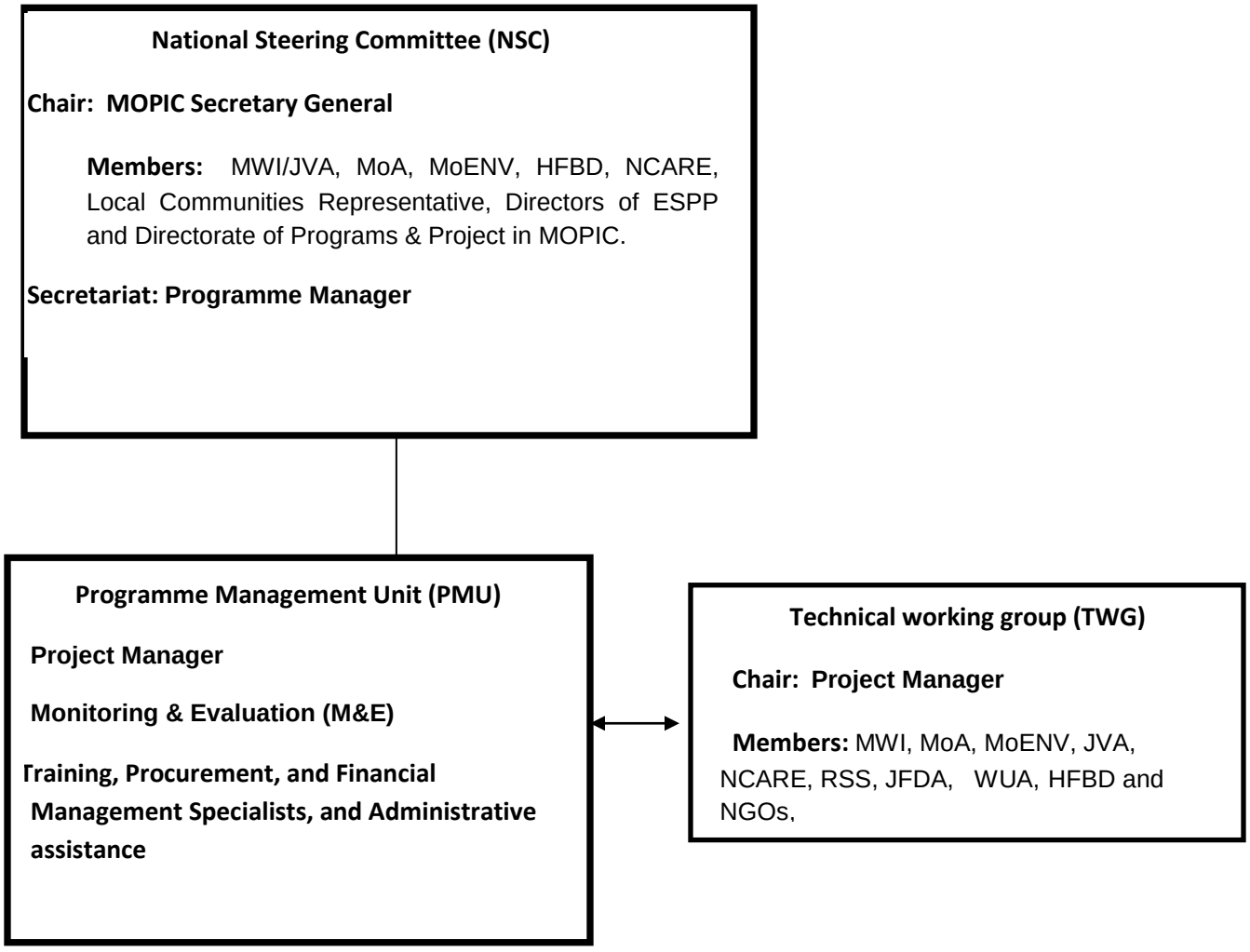
The PMU will coordinate the project activities and preparation of annual work plans and budgets; it will also ensure collaboration between stakeholders and conduct M&E. Local and international experts will be hired as consultants with expertise in relevant fields. The

PMU will be tasked to ensure liaison, communication, collaboration and joint problem-solving between entities; ensure timely external auditing of project accounts; ensure appropriateness of procurement and FM activities as per agreed terms; and act as the secretariat of the SC and chair the project‟s Technical Working Group (TWG).

National Steering Committee (NSC): The PMU will be guided by a SC, chaired by the Secretary General of MOPIC. Based on consolidated implementation progress reports submitted semi-annually by the PMU and periodical field visits, the SC will provide strategic guidance and oversight for the project (including on procurement, financial management, disbursement, M&E and reporting matters), advise on corrective measures, provide conflict resolution, and be responsible for approving annual work plans and associated budgets submitted by the PMU. The SC will include the secretary generals of MoA, MoENV, MWI/JVA, and the directors of ESPP and Directorate of Programs and Projects of MOPIC, HFBD, NCARE and Local Communities Representative .

Technical Working Group (TWG): the Project Manager will chair the Technical Working Group with focal points from MoA, MoENV, MWI, NCARE, JVA, WUAs , HFBD and RSS.

The TWG will discuss technical issues, enable information exchange between project activities, provide technical advice and guidance on various aspects of project implementation, and may also make recommendations to be discussed at the SC. It is crucial for project success that the PMU operate in a flexible, transparent and collaborative manner with all concerned parties. To this end, the TWG will be a key mechanism. The TWG will meet on a quarterly basis, or more often if required.


National Steering Committee (NSC)
Chair: MOPIC Secretary General
Members: MWI/JVA, MoA, MoENV, HFBD, NCARE, Local Communities Representative, Directors of ESPP and Directorate of Programs & Project in MOPIC.
Secretariat: Programme Manager
Programme Management Unit (PMU)
Project Manager
Monitoring & Evaluation (M&E)
Training, Procurement, and Financial Management Specialists, and Administrative assistance
Technical working group (TWG)
Chair: Project Manager
Members: MWI, MoA, MoENV, JVA, NCARE, RSS, JFDA, WUA, HFBD and NGOs,

A list of ASSAD AL AMMARIN members

واردات الجمعية من المشروع خلال شهر آب عام ٢٠١٠

Name	رقم القطعة	قيمة حش	قيمة المامة	قيمة الكبس	قيمة الحراثة	ضمان أرض	أسهم	انتساب	أخرى	ملاحظات
علي محمد علي سويلم	٢٨	١٦	١٦	٢٧						
محمد علي ابو شوشة	٣٧	١٦	١٦	٢٦		٩٠				
محمد اربيع العمارين	٢٩	١٠٦	١٦	٢٩						
علي مضغان العمارين	٣٠									
سالم ابو شوشة	٣٥									
حسين لافي العمارين	٢٧									
هارون عبدالله العمارين	٢٦									
موسى ابو شوشة	٣٦	٤+٤	٤	١٠		٩٠				
سليم ابو شوشة	٣٨	١٦	١٦	٢٣		٩٠				
عبدالله عيد العمارين	٤١	٨								
محمد العمرات	٣١	١٦	١٦	٢٣						
رجا خليفات	٣٣	١٦	١٦	١٠						
احمد المشاعلة	٣٤									
مصطفى السلامين	٣٢									
قطاع نسائي لياثنه	٢٢									
عبدالله سلامه عيد العمارين	٢٣									
علي سالم عيد العمارين	٢٥									
سليمان عبدالله عيد العمارين	١٩	١٦	١٦	٤						
محمد هارون النصرات	٢٠	١٦	١٦	٢١						
حسين علي السلامين	١٦	١٦								
محمد سليمان ابو شوشه	١٧	١٦	١٦	٢٣						
احمد سليمان الهلالات	١٥	١٦	١٦	٤		٩٠				
علي عبدالله قاسم الشماسين	١٤	١٦	١٦							
حسين هارون الحسنات	٨	١٦	١٦	٢٠						
سلمان عواد العمارين	١	١٦	١٦	٢٠						
محمد سلامة فرج المرازقة	٣	١٦								
محمد اشتيان العمارين	٦	١٦	١٦	٨						
عبدالله ابراهيم الكبايره	٩									
عيد اربيع شتيوي الكبايره	١٢	١٦	١٦	٢١						
محمد علي سلامه العمارين	١٨	١٦								
يحيى سالم عيد العمارين	١١	١٦	١٦	٩						
ناصر سالم ابو شوشه	١٠	١٦	١٦							
عيد سالم عيد العمارين	٥									
اضحيه عبدالله العمارين	١٣	٨	٨	١٢						
منال موسى العمارين	١٣									
فلحا عيال هويمل	A1									
فاطمة عيال هويمل	A1									
عزيزة ابو شوشه	A3	١٤	١٤	١٧						
طرفه اشتيان العمارين	A3									
فاطمة عبدالله عيال حميد	A3									
مريم عبدالله عيال عواد	A3	١٠	١٠	١٠						
دخيل الله قبلان سالم الفقير	مملوكه									
خليل سلمان								١٠	٥٠	
موسى خليل								١٠	٥٠	
مريم موسى		٨								
المجموع		٢٦٠	٢٠٨	٤٩	٢٦٠			٢٠	١٠٠	
المجموع الكلي		١٥٥٧								

بداية الوصـــل:

عضو

السائق

نهاية الوصـــل: ٢٥٠

عضو

أمين الصندوق

جمعية السد الأخضر التعاونية الزراعية
لاعادة استخدام المياه المستصلحة
متعددة الأغراض محدودة المسؤولية / معان
رئيس الجمعية
سجلت تحت رقم: ٢٢٢٨

واردات الجمعية من المشروع خلال شهر آب عام ٢٠١

Name	رقم القطعة	قيمة حش	قيمة المامة	قيمة الكبس	قيمة الحراثة	ضمان أرض	أسهم	انتساب	أخرى	ملاحظات
علي محمد علي سويلم	٢٨	١٦	—	٥٠		٩٠				
محمد علي ابو شوشة	٣٧	١٦	١٦	٥٠						
محمد اربيع العمارين	٢٩									
علي مضغان العمارين	٣٠									
سالم ابو شوشة	٣٥									
حسين لافي العمارين	٢٧	١٦	١٦	—		٩٠				
هارون عبدالله العمارين	٢٦	٨	٨	١١		٩٠				
موسى ابو شوشة	٣٦	١٢	١٢	٢٠						
سليم ابو شوشة	٣٨	١٦	١٦	٢٠						
عبدالله عيد العمارين	٤١	١٦	١٦	٢٠						
محمد العمرات	٣١	١٦	١٦							
رجا خليفات	٣٣	١٦	١٦	٧		٩٠				
احمد المشاعلة	٣٤									
مصطفى السلامين	٣٢									
قطاع نسائي لياثنه	٢٢									
عبدالله سلامه عيد العمارين	٢٣									
علي سالم عيد العمارين	٢٥									
سليمان عبدالله عيد العمارين	١٩									
محمد هارون النصرات	٢٠	١٦	١٦	٢٠		٩٠				
حسين علي السلامين	١٦	١٦	١٦	٥٠		٩٠				
محمد سليمان ابو شوشه	١٧	١٦	١٦	٧٩						
احمد سليمان الهلالات	١٥	١٦	١٦	٢٠						
علي عبدالله قاسم الشماسين	١٤									
حسين هارون الحسنات	٨	١٦	١٦	٦٠		٩٠				
سلمان عواد العمارين	١									
محمد سلامة فرج المرازقة	٣	١٦	١٦	١٠		٩٠				
محمد اشتيان العمارين	٦									
عبدالله ابراهيم الكبايره	٩	١٦	١٦	٥٠						
عيد اربيع شتيوي الكبايره	١٢	١٦	١٦	٣٥		٩٠				
محمد علي سلامه العمارين	١٨	١٦	١٢	—		٩٠				
يحيى سالم عيد العمارين	١١	١٦	—	١٠						
ناصر سالم ابو شوشه	١٠									
عيد سالم عيد العمارين	٥									
اضحيه عبدالله العمارين	١٣					٤٥				
منال موسى العمارين	١٣	٨	٨	١٥		٤٥				
فلحا عيال هويمل	A1									
فاطمة عيال هويمل	A1									
عزيزة ابو شوشه	A3	١٤	١٤	١٥						
طرفه اشتيان العمارين	A3									
فاطمة عبدالله عيال حميد	A3	٢٠	٢٠	—						
مريم عبدالله عيال عواد	A3									
دخيل الله قبلان سالم الفقير	مملوكه									
المجموع		٢٢٤	٢٠٨	٤٤٧		٩٩٠				
المجموع الكلي		٥٠٦٨								

بداية الوصل: ١٢٠٦ نهاية الوصل: ١٤٠٥ الوصل الاحد

عضو عضو عضو

السائق أمين الصندوق رئيس الجمعية

جمعية السد الأحمر التعاونية للزراعة
باستخدام المياه المستصلحة
متعددة الأغراض المحدودة المسؤولية / معان
سجلت تحت رقم: ٣٣٢٨
بتاريخ: ٢٠٠٣/٥/١٣

واردات الجمعية من المشروع خلال شهر آب عام ٢٠٠٩

Name	رقم القطعة	قيمة حش	قيمة المامة	قيمة الكبس	قيمة الحراثة	ضمان ارض	اسهم	انتساب	اخرى	ملاحظات
علي محمد علي سويلم	٢٨	١٦	١٦	٢٠						
محمد علي ابو شوشة	٣٧									
محمد اربيع العمارين	٢٩	١٦	١٦	٢٥						
علي مضغان العمارين	٣٠									
سالم ابو شوشة	٣٥	١٦	١٦	٢٨						
حسين لافي العمارين	٢٧									
هارون عبدالله العمارين	٢٦	٨	٨	١٧						
موسى ابو شوشة	٣٦	٨	—	٢٧						
سليم ابو شوشة	٣٨	١٦	١٦	٢٨						
عبدالله عيد العمارين	٤١	٨								
محمد العمرات	٣١	١٦	١٦	٢١						
رجا خليفات	٣٣	١٦								
احمد المشاعلة	٣٤									
مصطفى السلامين	٣٢									
قطاع نساني لياثنه	٢٢	٨	—	١٨						
عبدالله سلامه عيد العمارين	٢٣									
علي سالم عيد العمارين	٢٥									
سليمان عبدالله عيد العمارين	١٩	١٦	١٦	٢٤						
محمد هارون النصرات	٢٠	١٦	١٦	٢٦	-					
حسين علي السلامين	١٦									
محمد سليمان ابو شوشه	١٧									
احمد سليمان الهلالات	١٥									
علي عبدالله قاسم الشماسين	١٤	١٦	١٦	٢٧						
حسين هارون الحسنات	٨									
سلمان عواد العمارين	١	١٦								
محمد سلامة فرج المرازقة	٣									
محمد اشتيان العمارين	٦	١٦	١٦	٢٤						
عبدالله ابراهيم الكبايره	٩	١٦	١٦							
عبد اربيع شتيوي الكبايره	١٢	١٦	١٦	٢٠						
محمد علي سلامه العمارين	١٨									
يحيى سالم عيد العمارين	١١	١٦	١٦	٢٢						
ناصر سالم ابو شوشه	١٠	١٦	١٦	٢٥						
عيد سالم عيد العمارين	٥									
اضحيه عبدالله العمارين	١٣									
منال موسى العمارين	١٣	٨	٨	٢٥						
فلحا عيال هويمل	A1									
فاطمة عيال هويمل	A1	٢٠								
عزيزة ابو شوشه	A3									
طرفه اشتيان العمارين	A3									
فاطمة عبدالله عيال حميد	A3									
مريم عبدالله عيال عواد	A3	١٠	١٠	٤٠						
دخيل الله قبلان سالم الفقير	مملوكه									
مريم موسى										
					١٠					
المجموع		٢١٠	٢٣٤	٤٢٧						
المجموع الكلي		٩٩١								

جمعية السد الأخضر التعاونية الزراعية
لاعادة استخدام المياه العادمة المعالجة
المعتمدة الأغراض معدودة المسؤولية / عمان
سجلت تحت رقم: ٢٢٢٨
بتاريخ: ٢٠٠٢/٥/١٣

بداية الوصـــل: ١٨٩١ نهاية الوصـــل: ١١٢

عضو عضو عضو عضو

السائق

أمين الصندوق

رئيس الجمعية

واردات الجمعية من المشروع خلال شهر آب عام ٢٠٠١

Name	رقم القطعة	قيمة حش	قيمة المامة	قيمة الكبس	قيمة الحراثة	ضمان ارض	أسهم	انتساب	اخرى	ملاحظات
علي محمد علي مويلم	٢٨									
محمد علي ابو شوشة	٣٧									
محمد اربيع العمارين	٢٩									
علي مضعان العمارين	٣٠									
سالم ابو شوشة	٣٥	١٦	١٦	٣٠						
حسين لافي العمارين	٢٧	٩		١٨						
هارون عبدالله العمارين	٢٦	٩	٨	١٨						
موسى ابو شوشة	٣٦									
سليم ابو شوشة	٣٨	١٦	١٦	٥٠						
عبدالله عيد العمارين	٤١	٨	٨	١٨						
محمد العمرات	٣١									
رجا خليفات	٣٣	١٦								
احمد المشاعلة	٣٤									
مصطفى السلامين	٣٢									
قطاع نسائي لياثه	٢٢	١٦	١٦	٤٠						
عبدالله سلامه عيد العمارين	٢٣									
علي سالم عيد العمارين	٢٥									
سليمان عبدالله عيد العمارين	١٩									
محمد هارون النصرات	٢٠									
حسين علي السلامين	١٦									
محمد سليمان ابو شوشه	١٧					٩٠				
احمد سليمان الهلالات	١٥	١٦	١٦	٢٠						
علي عبدالله قاسم الشماسين	١٤	١٦	١٦	٤٠		٩٠				
حسين هارون الحسنات	٨									
سلمان عواد العمارين	١									
محمد سلامة فرج المرازقة	٣	١٦	١٦	٤٠						
محمد اشتيان العمارين	٦									
عبدالله ابراهيم الكبايره	٩	١٦	١٦	٤٠						
عيد اربيع شتيوي الكبايره	١٢	١٦	١٦	٢٠						
محمد علي سلامه العمارين	١٨									
يحيى سالم عيد العمارين	١١	١٦	١٦	٤٠						
ناصر سالم ابو شوشه	١٠									
عيد سالم عيد العمارين	٥	١٦	١٦	٤٠						
اضحيه عبدالله العمارين	١٣	٨	٨	٤٠						
منال موسى العمارين	١٣									
فتحا عيال هويمل	A1									
فاطمة عيال هويمل	A1									
عزيزة ابو شوشه	A3	١٠	١٠	٤٠						
طرفه اشتيان العمارين	A3									
فاطمة عبدالله عيال حميد	A3									
مريم عبدالله عيال عواد	A3	١٠	١٠	٤٠						
دخيل الله قبلان سالم الفقير	مملوكه									
مرتبة موسى										
المجموع		٢٧٨	٢٠٤	٣٤٩		١٨٠				
المجموع الكلي		٩٦١								

بداية الوصل: ١٢٥٨ نهاية الوصل: ٢٢٨٠

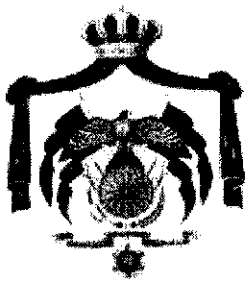
عضو عضو

السائق أمين الصندوق

الوصل الملغي

جمعية السلط الأخضر التعاونية الزراعية
لاعادة استخدام المياه المستعملة
متعددة الأغراض محدودة المسؤولية / معان
سجلت تحت رقم: ٢٢٢٨
بتاريخ: ٢٠٠٢/٥/١٣

رئيس الجمعية



اتفاقية تمويل
مشروع ماكنات حصاد البرسيم

بين

وزارة التخطيط والتعاون الدولي
برنامج تعزيز الإنتاجية الاقتصادية والاجتماعية

و

المؤسسة التعاونية الأردنية

و

جمعية السد الأحمر التعاونية

2012