AFB/PPRC.15/13
17 September 2014

Adaptation Fund Board
Project and Programme Review Committee
Fifteenth Meeting
Bonn, Germany, 7-8 October 2014

Agenda Item 6 i)

PROPOSAL FOR JORDAN

Background

1. The Operational Policies and Guidelines (OPG) for Parties to Access Resources from the Adaptation Fund (the Fund), adopted by the Adaptation Fund Board (the Board), state in paragraph 45 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the endorsement of the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would ultimately require the Board's approval.

2. The Templates approved by the Board (OPG, Annex 4) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

> *For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.*

3. The first four criteria mentioned above are:
   1. Country Eligibility,
   2. Project Eligibility,
   3. Resource Availability, and
   4. Eligibility of NIE/MIE.

4. The fifth criterion, applied when reviewing a fully-developed project document, is:
   5. Implementation Arrangements.

5. It is worth noting that since the twenty-second Board meeting, the Environmental and Social (E&S) Policy of the Fund was approved and consequently compliance with the Policy has been included in the review criteria both for concept documents and fully-developed project documents. The proposals template was revised as well, to include sections requesting demonstration of compliance of the project/programme with the E&S Policy.

6. In its seventeenth meeting, the Board decided (Decision B.17/7) to approve "Instructions for preparing a request for project or programme funding from the Adaptation Fund", contained in the Annex to document AFB/PPRC.8/4, which further outlines applicable review criteria for both concepts and fully-developed proposals. The latest version of this document was launched in conjunction with the revision of the Operational Policies and Guidelines in November 2013.

7. Based on the Board Decision B.9/2, the first call for project and programme proposals was issued and an invitation letter to eligible Parties to submit project and programme proposals to the Fund was sent out on April 8, 2010.

8. According to the Board Decision B.12/10, a project or programme proposal needs to be received by the secretariat no less than nine weeks before a Board meeting, in order to be considered by the Board in that meeting.

9. The following fully-developed project document titled “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” was submitted by the Ministry of Planning and International Cooperation (MOPIC), which is the National Implementing Entity of the Adaptation Fund for Jordan. This is the third submission of the project. It was first submitted as a concept for the 19th AFB meeting and was not endorsed. It was subsequently resubmitted at the twenty-second meeting as a concept, along with a request for Project Formulation Grant (PFG) and the Board decided to:

(a) Endorse the programme document, as supplemented by the clarification response provided by the Ministry of Planning and International Cooperation (MOPIC) to the request made by the technical review;

(b) Request the secretariat to transmit to MOPIC the observations in the review sheet annexed to the notification of the Board’s decision, as well as the following issues:

(i) The fully-developed programme document should clearly explain how the different projects and stakeholders within the programme will be coordinated during its implementation;

(ii) More specific information should be provided about the criteria to be applied to determine the vulnerability of the target communities under projects 1.2 to 1.4;

(iii) The relevant existing policies and standards for all the activities of the programme will need to be specified in greater detail in the fully-developed programme document;

(iv) At the fully-developed programme document stage the synergies to be sought and coordination mechanisms with existing initiatives should be outlined;

(v) The fully-developed programme document should demonstrate that each project under the programme has been designed with full participation of relevant stakeholders, including vulnerable groups, and taking into account gender consideration.

(c) Approve the Programme Formulation Grant of US$ 29,500;

(d) Request MOPIC to transmit the observations under sub-paragraph (b) to the Government of Jordan; and

(e) Encourage the Government of Jordan to submit through MOPIC a fully-developed programme proposal that would address the observations under sub-paragraph (b).

(Decision B.22/6)

10. The present submission of the fully-developed project document was received by the secretariat in time to be considered in the twenty-fourth Board meeting. The secretariat carried out a technical review of the project proposal, assigned it the diary number JOR/NIE/Multi/2012/1, and completed a review sheet.

11. In accordance with a request to the secretariat made by the Board in its 10th meeting, the secretariat shared this review sheet with MOPIC, and offered it the opportunity of providing responses before the review sheet was sent to the PPRC.

12. The secretariat is submitting to the PPRC the summary and, pursuant to decision B.17/15, the final technical review of the project, both prepared by the secretariat, along with the final submission of the proposal in the following section.

Project Summary

Jordan – 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

Implementing Entity: *MOPIC*
Project/Programme Execution Cost: USD 703,000
Total Project/Programme Cost: USD 8,503,000
Implementing Fee: USD 723,000
Financing Requested: USD 9,226,000

Project/Programme Background and Context: Studies suggest that climate change will exacerbate current aridity and conditions of water shortage in Jordan. 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.

The overall objective of the proposed programme is to 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 and resilience. The programme presents six projects divided under two main components, with component 1 presenting four projects related to concrete adaptation solutions to address water scarcity and agriculture in vulnerable regions in Jordan, and component 2 presenting two projects related to policy reforms, training and knowledge management.

The programme objective will be achieved through the following two components:

- 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),

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

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) (USD 5,900,000)

This component will consists of six separate projects which will help providing a unique, efficient, simple and cost effective system to people in arid regions who suffer from water scarcity, and food insecurity through the deployment of advanced innovative irrigation methods such as drip, spray and micro-sprinkler irrigation. The component will also aim at increasing adaptation to climate change through providing unique, efficient, simple and cost effective systems to people in arid regions who suffer from water scarcity. The component will in addition seek to limit 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, and implement a holistic approach for integrated water management in remote

arid regions. Fresh water sources for potable water supplies and other priority uses will be released and treated wastewater will be alternatively used for irrigation purposes. The component will assess as well the vulnerability of ecosystems and planning food security and humanitarian programs and enhance water distribution services and increase irrigation network efficiency. Finally, it will 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 (USD 1,900,000)

Through this component, strengthened ability of remote poor communities to make informed decisions about climate change-driven hazards affecting their specific locations will be sought. Activities to involve and educate the engaged local community in all the phases of the project will be implemented. The component will also aim at reducing the health risks associated with irrigation practices and motivating the targeted communities to work, cooperate and support each other. It will also reinforce the concept of participatory water & agriculture development and management approach that involves users, planners and policy makers at all levels. Finally, it will enhance the quality of life and food security in arid regions and contribute to climate change adaptation and support the development of a competitive, inclusive and sustainable agribusiness industry.

ADAPTATION FUND

ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regular-sized Project

Country/Region: **Jordan**
Project/Programme Title: **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**
AF Project ID: **JOR/NIE/Multi/2012/1**
NIE/MIE Project/Programme ID: Requested Financing from Adaptation Fund (US Dollars): **9,226,000**
Regular Project/Programme Concept Approval Date: **Oct 2013** Anticipated Submission of final RP document (if applicable): **n/a**
Reviewer and contact person: **Daouda Ndiaye** Co-reviewer(s): **Mikko Ollikainen**
NIE/MIE Contact Person: **Hazar Badran**

Review Criteria	Questions	Comments on 21 August 2014	Comments on 8 Sept 2014
Country Eligibility	1. Is the country party to the Kyoto Protocol?	Yes.	
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	Yes. Jordan is one of the ten driest countries in the world with demand for water exceeding the available resources, and this will be exacerbated by future climate change.	
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	No.	

	2. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?	This programme is very relevant for a country that clearly faces CC risks in addition to existing biophysical challenges, such as water scarcity and land degradation. The proposed approach includes concrete adaption actions of major significance to two important sectors: water and agriculture sector. The proposed actions for water build on an existing effort by the government to increase water harvesting and the reuse of waste water for productive purposes, especially in regions where irrigation is critical. However, the way the programme's activities are presented could be made more reader-friendly and organized. Although the projects 1 to 4 have different stakeholders and location, they could be presented as one sub-component, under component 1, for more clarity. Any information related to budget, results indicators, economic, social and environmental benefits or implementation arrangement should be removed from that section and presented in the relevant section, in a coherent way as subcomponents of the programme. The same would apply with the other projects, which could be presented in a more concise and coherent manner. The details of each project could be included as an Annex instead. **CR1** Also, the proposal should demonstrate how the projects under the programme would have synergies in their objectives and implementation and how they would be coordinated. **CR2** Please revise the table on programme components and financing (p. 16), to clearly present the expected outcomes and outputs, with the latter including clear targets, instead of indicators. **CR3**	**CR1**: Addressed. However, having results frameworks for each project could be confusing for the reader. It would be best to develop a single RF for the programme, reflecting the outcomes and outputs presented under the table on programme components and financing. **CR2**: Addressed. **CR3**: Partially addressed. The original table's outputs were well presented. The request was to add specific targets to the "concrete outputs" column. More generally there seems to be a confusion between the request for providing core indicator(s) for the whole programme and the definition of project-level outcomes, outputs and their relevant indicators.

	3. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy of the Fund?	Yes, the project takes account of multiple benefits to be generated from the investment, including considerations of the critical role of women. The entire focus of the project is to address priority needs of vulnerable communities in geographies of crucial importance to the national economy. Hence the integrated approach to taking into account environment, economic and social needs is clearly articulated. Please elaborate on the measures to be taken to ensure the quality of the treated water, especially for the end users of agricultural products grown using such resource. **CR4**	**CR4:** Addressed.
	4. Is the project / programme cost effective?	Yes, the proposed approach can be deemed cost-effective because it will build on existing and planned government commitments to the two targeted sectors, which will also ensure sustainability of the outcomes. However, the demonstration of cost effectiveness could be improved through providing the costs of alternatives to the proposed programme activities, i.e. investment in large water retention/harvesting infrastructures, cost of fresh water for irrigation vs treated waste water, alternative water resources, alternatives to permaculture, etc. **CR5**	**CR5:** Not addressed. On one hand the proposal presents the economic benefits of the programme. One the other hand, no alternatives to the current options are presented, to compare and assess cost effectiveness of the programme.
	5. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?	Yes, consistency with the national development strategies is clearly articulated and justified. It is further strengthened by the fact the NIE is also the government entity responsible for the country's development planning. However, the section could gain from being more concise and strictly demonstrate consistency with national plans and strategies with the relevant information. **CR6**	**CR6:** Partially addressed. The section could gain from more concision.

	6. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund??	Yes. However, it is stated in the proposal that "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." In this specific programme, please explain which entities will be responsible for monitoring the quality of water used across the different projects in the programme. If there is any cost involved, please specify if it will be covered by the programme, paid for by the beneficiaries or through the government. **CR7**	**CR7:** Addressed.
	7. Is there duplication of project / programme with other funding sources?	No. However, the proposal does not explain how the programme will seek synergy or be complementary with the most relevant of the other initiatives described in this section, i.e. the GEF/SCCF project, relevant KFW-, GIZ- or USA-funded initiatives, etc. **CR8**	**CR8:** Addressed.
	8. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?	Yes, mainly under component 2.	
	9. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations?	Yes. However, please justify the lack of consultation during the full programme preparation phase, for project 1.5. **CR9.** Also, please clarify the number and quality of people, including gender consideration, who attended the consultation meeting regarding the permaculture project. **CR10.** Please provide the list of participants, disaggregated by gender for the meeting held on May 18, for projects 1.3, 1.4 and 2.3. **CR11**. Also, the information in annex 2 needs to be provided in English or summarized to provide information on participants by gender and institution/stakeholder name. **CR12**	**CR9:** not addressed. The information provided does not allow assessing the consultation process for project 1.5. **CR10:** Addressed. **CR11:** Addressed. **CR12:** Addressed.
	10. Is the requested financing justified on the basis of full cost of adaptation reasoning?	Yes.	

	11. Is the project / program aligned with AF's results framework?	Yes.	
	12. Has the sustainability of the project/programme outcomes been taken into account when designing the project?	Yes.	
	13. Does the project / programme provide an overview of environmental and social impacts / risks identified?	No. **CAR1**. Please complete section K under the new AF proposal template including the table on compliance with the E&S principles and taking into account the points raised below: In the absence of the ESP section (K), it is difficult to assess compliance, and this is exacerbated by the structure of the document. Although the proposal was developed taking principles of the ESP into account, there are a number of environmental and social risks that can be identified associated with the programme. The evident ones include indigenous/vulnerable groups (Beduins), public health, soils, gender, and possibly climate change. The risk on public health is the most compelling one. The reuse of treated wastewater carries a number of environmental and social risks. The risk related to public health through consumption/exposure to pathogenic micro-organisms is the greatest threat. Exposure to heavy metals, harmful organic substances (drugs, endocrine disruptors) is a lesser risk. There are a number of irrigation risks as well, such as soil salinisation and nutrients loading. In case the reuse of treated wastewater requires uphill pumping, greenhouse gas emissions may be significant. Building water retention dams in a watershed always carries risks.	**CAR1**: Partially addressed. Although a table on compliance with the E&S principles is provided, no potential impacts and risks or further assessment or mitigation measures were identified, including risks on public health and pollution as well as soil conservation, all of which were identified in previous EIAs and mitigation presented (see example of EMMP p.170-184). Also, several risks rated medium to very high are identified under table p.185-190, for which mitigation measures or procedures are not provided. However a list of mitigation measures associated with wastewater reuse is provided in p.223 some of which could be used to address some of the concerns above. This emphasizes again the need to reorganize the document in a more structured and coherent manner.
Resource	1. Is the requested project /	Yes.	

Availability	programme funding within the cap of the country?		
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	Yes. The requested Implementing Entity fees are set at 8.5 per cent of the total programme budget before the fees.	
	3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget (including the fee)?	Yes. The requested execution costs are set at 8.27 per cent of the total programme budget.	
Eligibility of NIE/MIE	4. Is the project/programme submitted through an eligible NIE/MIE that has been accredited by the Board?	Yes. MOPIC is an accredited NIE.	
Implementation Arrangement	1. Is there adequate arrangement for project / programme management?	Yes. However, it is not clear what the role of MOPIC is: the implementing entity only or an executing entity as well? Also, its role as implementing entity is not clearly defined. **CR13**	**CR13**: Addressed.
	2. Are there measures for financial and project/programme risk management?	Yes.	

	3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy of the Fund?	No. **CAR2**: Please complete Part III. Section C of the new AF proposal template, taking into account the points raised below: For ESP compliance, the risks that have been identified (a process that should be formalized and made complete) should be the subject of a proper assessment and, most of all, result in the development of an effective management plan. The proposal currently does not seem to provide sufficient management and monitoring measures to ensure that the public health risk is mitigated. The Environment Protection Law link in the proposal leads to a document in Arabic which makes it difficult to determine if EIA under national regulations is required. The standards listed on p. 181-182 are presented in a very abbreviated manner. The key issue, however, is with the application of the standards and the performance of the WAJ/MOE monitoring system that is in place. That information seems to be lacking from the proposal. Furthermore, for each wastewater reuse project, the safeguarding measures should be listed and made explicit. For example, in case of an overload of wastewater entering a treatment plant, the location where the untreated surplus will be discharged should be described. Also, any risk of it entering the irrigation system should be highlighted. The specific nature of the wastewater (domestic, industrial) needs to be taken into consideration, as well as the possibility of illegal or inappropriate disposal of wastewater. **CR14:** Please include an ESMP, together with implementation arrangements and M&E provisions, which will contain all the relevant elements. The ESMP is required for category B projects for which the proposed activities requiring environmental and social assessment do not represent a minor part of the project.	**CAR2**: Addressed. **CR14**: Somewhat addressed, although there is a need to present the ESMP in a more structured manner.

	4. Is a budget on the Implementing Entity Management Fee use included?	Yes. However, such budget is not justified, given the lack of distinction between the implementation and execution roles of MOPIC. Also, the development and preparation budget under the NIE fees (144,600) is not justified given the PFG already provided to the NIE for programme preparation. **CR15**	**CR15**: Partially addressed. The "Development and preparation" budget is not explained nor justified.
	5. Is an explanation and a breakdown of the execution costs included?	Yes. However, it does not explain how execution costs of the projects' executing entities, i.e. Min. of Environment, Jordan Water Authority etc, will be covered. **CR16**	**CR16**: Addressed.
	6. Is a detailed budget including budget notes included?	No. Although budget details are provided here and there within the document, under the projects narrative and annexes 1 and 2, it is not organized to allow for a proper review of the whole programme'' budget. **CR17**	**CR17**: Not addressed. The programme budget was not organized in a way to allow for an assessment of the costs based on the programme's expected outputs. In addition the proposal does not provide budget notes.
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans ?	Yes. However, the role of the project executing entities under the programme is not explained in the M&E table, p. 225. **CR18**.	**CR18**: Addressed.
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	Yes.	
	9. Does the project/programme's results framework align with the AF's results framework and include sex-disaggregated data, targets and indicators? Does it include at least one core outcome indicator from the Fund's results framework?	Yes. An alignment table is provided. However, the results framework is very weak and does not allow for a proper measurement of the achievement of the programme's objectives. Also, it does not include sex disaggregated data nor an AF core outcome indicator. **CR19**	**CR19**: Not addressed.

	10. Is a disbursement schedule with time-bound milestones included?	Yes.	

Technical Summary	Jordan is a country particularly vulnerable to drought, being one of the ten driest countries in the world with demand for water exceeding the available resources, which will be exacerbated by future climate change. The proposal seeks to 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. The programme presents eight projects divided under two main components, with component 1 presenting five projects related to concrete adaptation solutions to address water scarcity and agriculture in vulnerable regions in Jordan, and component 2 presenting three projects related to policy reforms, training and knowledge management. The initial review found that although the proposed activities were very relevant to the challenges faced by Jordan in the water and agriculture sector, a number of issues were still to be clarified. These included the need for improving and simplifying the presentation of projects under the programme and to demonstrate coherence and complementarities among them; the need to further demonstrate the programme cost effectiveness; issues related to compliance with the E&S Policy of the Fund; weakness of the results framework and information gap on the consultation process. Although the revised proposal has made some progress in addressing the requested corrective actions and clarifications made during the initial review, there remains key issues that are pending and for which the following observations are made: (i) As a general observation, the proposal could gain from more concision and structuring; as an example among others, the section on consistency with the national development strategies could be limited to strictly demonstrate consistency with national plans and strategies with the relevant information; (ii) The demonstration of cost effectiveness could be improved through providing the costs of alternatives to the proposed programme activities, including but not limited to investment in large water retention/harvesting infrastructures, cost of fresh water for irrigation vs treated waste water, alternative water resources and alternatives to permaculture; (iii) Although a table on compliance with the E&S principles is provided, no potential impacts and risks or further assessment or mitigation measures were identified, including risks on public health and pollution as well as soil conservation. Also, several risks rated medium to very high were identified in other parts of the document, for which mitigation measures or procedures are not provided; (iv) The proposal should include an ESMP, together with implementation arrangements and M&E provisions,

	which will contain all the relevant elements. The ESMP is required for category B projects for which the proposed activities requiring environmental and social assessment do not represent a minor part of the project. (v) The programme budget needs to be organized in a way to allow for an assessment of the costs based on the programme's expected outputs. In addition the proposal should include budget notes; (vi) The proposal should justify the development and preparation budget under the implementing entity fees (144,600), since a PFG was already provided to the NIE for programme preparation. (vii) The proposal should include a programme results framework which should include programme outcome and output indicators, baseline and targets which would help in the achievement of the programme's objectives, including sex disaggregated data and at least one AF core outcome indicator.
Date:	9 September 2014.

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)/ Enhanced Social & Economic Productivity Program** (**EPP**)

EXECUTING ENTITY/IES:
Jordan Valley Authority (JVA) /Water Authority of Jordan (WAJ)
Ministry of Water and Irrigation (MWI)
The Petra Development Tourism Region Authority (PDTRA)
Ministry of Environment (MOE)
Ministry of Agriculture (MOA)
National Center for Agricultural Research & Extension (NCARE)
The Royal Scientific Society (RSS)
Jordan Food & Drug Administration (JFDA)
Department of Meteorology
Jordan Standards & Metrology Organization (JSMO)

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

LIST OFABBREVIATION

AFD	French Development Agency
EPP	Enhanced Social & Economic Productivity Program
GDP	Gross Domestic Product
GoJ	Government of Jordan
ha	Hectare
HDPE	High-density polyethylene
JFDA	Jordan Food & Drug Administration
JSMO	Jordan Standards & Metrology Organization
JRV	Jordan Rift Valley
JVA	Jordan Valley Authority
KAC	King Abdullah Canal
MCM	Million cubic meters
MDG	Millennium Development Goal
MENA	Middle East and North Africa
MoA	Ministry of Agriculture
MoEnv	Ministry of Environment
MOU	Memorandum of Understanding
MWI	Ministry of Water and Irrigation
NCARE	National Center for Agricultural Research & Extension
PDTRA	The Petra Development& Tourism Region Authority
RIAL	Reuse for Industry Agriculture & Landscaping
RSS	The Royal Scientific Society
SNC	Jordan's Second National Communication to the UNFCCC
TNC	Jordan's Third National Communication to the UNFCCC
UPVC	un-plasticized polyvinyl chloride
USAID	United states agency for International Development
WAJ	Water Authority of Jordan
WUA	Water Users Association
WWTP	Waste Water Treatment Plant

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, isan 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 thetotal 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 rainfed 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 rainfed 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 rainfed 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. Over91 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 Ghour 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:** 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 000inhabitants, 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 rain fed 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 rain fed 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 rainfed 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.

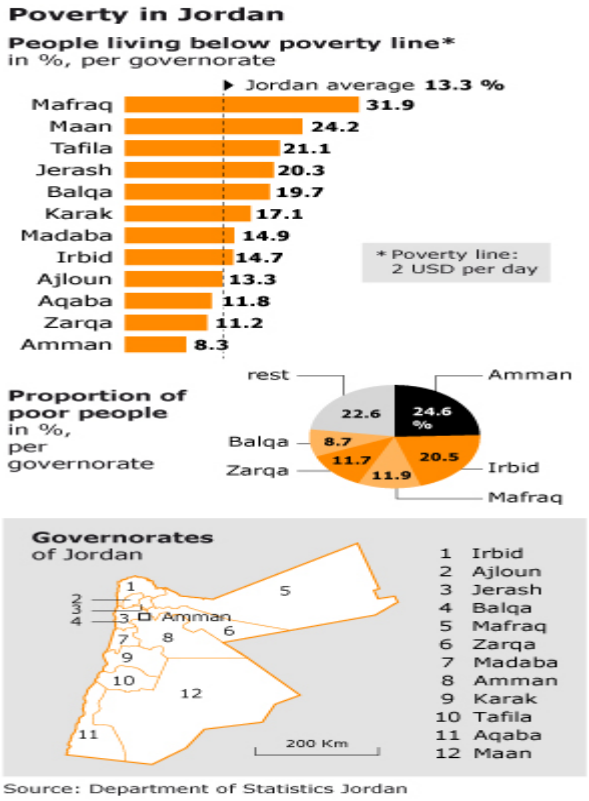

Figure (2): Poverty in Jordan

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.

Treated 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 98.9percent 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 & Permaculture).***

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.
- Limit 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.
- 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	TARGETS	AMOUNT(US$)
Component 1: Sub-Component (A): **Climate change adaptation of water Sector "Reuse of treated wastewater" (project 1.1, 1.2, 1.3, 1.4):**	Quantity (m3) of Supplementary water available for agriculture,	Increased water availability and efficient use through wastewater reuse	**21,591,400 MCM** TWW available for agriculture	**5,900,000**
	or number of families benefiting from the project	Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	**960 ,Males** **480 Females**	
Component 1: Sub-Component (B): **Climate change adaptation of Agricultural Sector through *rainwater harvesting& Permaculture, Projects "1.5,1.6")***	**Quantity (m3) of Supplementary Fresh water available for agriculture,**	Increased water availability and efficient use through Rianwater Harvesting	**300,000 M3/Year**	
	Number of beneficiaries -	Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	**3160 Male** **1580 Female**	

PROJECT/PROGRAMME COMPONENTS	EXPECTED CONCRETE OUTPUTS	EXPECTED OUTCOMES	TARGETS	AMOUNT(US$)
Component 2: Capacity Building at both the national and local/community levels respectively, knowledge Dissemination, policy and legislation mainstreaming. **projects (2.1),(2.2),(2.3)**	Number of Targeted population groups aware of Climate change risks on natural resources and the ecosystem.	Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	**5339 Male** **1141 Females**	**1,900,000**
	mber of new micro-enterprises created linked to Agribusiness Industries	Increased ecosystem resilience in response to climate change and variability-induced stress	**300**	
	Or Number of New direct& indirect Jobs related to Agribusiness in Jordan Valley		**18,000 Jobs (5400 for Females, 14400 Males)**	
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 2015
Mid-term Review (if planned)	December 2016
Project/Programme Closing	January 2019
Terminal Evaluation	April 2019

PART II: PROJECT / PROGRAMME JUSTIFICATION

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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.

Sub-Component (A): Climate change adaptation of water Sector Through Technology Transfer (Projects 1.1, 1.2, 1.3, 1.4):

Project (1.1) *Reuse of Treated Wastewater for On-Farm Agricultural Adaptation 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). **Four locations are being proposed as pilots for wastewater reuse, one in southern Jordan at Wadi Mousa-Petra Region, at Northern Jordan Valley where farming pattern is mainly citrus and vegetables, at North Shouneh in the upper north of the Middle of Jordan Valley & at Tal Al Mantah in Dair Allah District.**
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.

Background & Current Status of the Project Area:

Wadi Mousa is located north of Petra, in the ***Ma'an Governorate***, with a population of approximately 28,000. The area is characterized by hot summers and cold dry winters. Rainfall occurs between November and April in an irregular pattern, and the annual rainfall is less than 200 mm (RIAL Environmental Review, 2006). The infrastructure of the Wadi Mousa pilot includes sand filters and a pump station within the Wadi Mousa WWTP boundary, a reclaimed water transfer main, an irrigation water sub-main with irrigation head units, and farm units. The treatment process includes preliminary treatment (coarse screen and grit removal), secondary biological process, final clarifier, effluent polishing lagoon, chlorination process, sludge holding tank and sludge drying beds (see Figure 1.1-A). Odor control units are provided to minimize

odor emissions. Design treatment capacity is 3,700m^3/d. As of 2010, Wadi Mousa WWTP was receiving approximately 3,000 m3/d of wastewater and generating over 2,800 m^3/d of reclaimed water. The quality of reclaimed water meets Jordanian standards **(JS 893/2006)** for reuse as irrigation water.Annex (6)

WAJ collects samples for effluent quality analysis from the onsite effluent polishing ponds. Before leaving the site for irrigation, water is routed through sand filters located at the reclaimed water pump station.

The Wadi Mousa pilot irrigates with reclaimed water from the Wadi Mousa WWTP. In 2004, the delivery of the reclaimed water to the pilot project site was formalized in a Memorandum of Understanding (MOU) between the Petra Regional Authority (PRA), the Water Authority of Jordan (WAJ), and the Badia Research and Development Program (BRDP). This MOU guaranteed farmers access to the reclaimed water. **The main goal of the proposed expansion of the wastewater reuse project at Wadi Mousa is to 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).**

Need for the project:

1- Jordan is considered the fourth most water poor country in the world, so the need to find new water resources arises, and one of the most important water resources is treated wastewater.
2- The results of climate change in the area have caused elimination of most of the livestock in the area due to lack of natural pastures and forage.
3- Availability of excess amounts of treated wastewater from the WWTP which is currently on continuous rise.
4- Forage is a cash crop yet not readily available compounded with its marketing and storage problems (RIAL baseline report, 2004).

Figure (1.1- A): Wadi Musa WWTP Layout

USAID Water Reuse and Environmental Conservation Project
Wadi Mousa Reuse Pilot Project Technical Assistance Plan

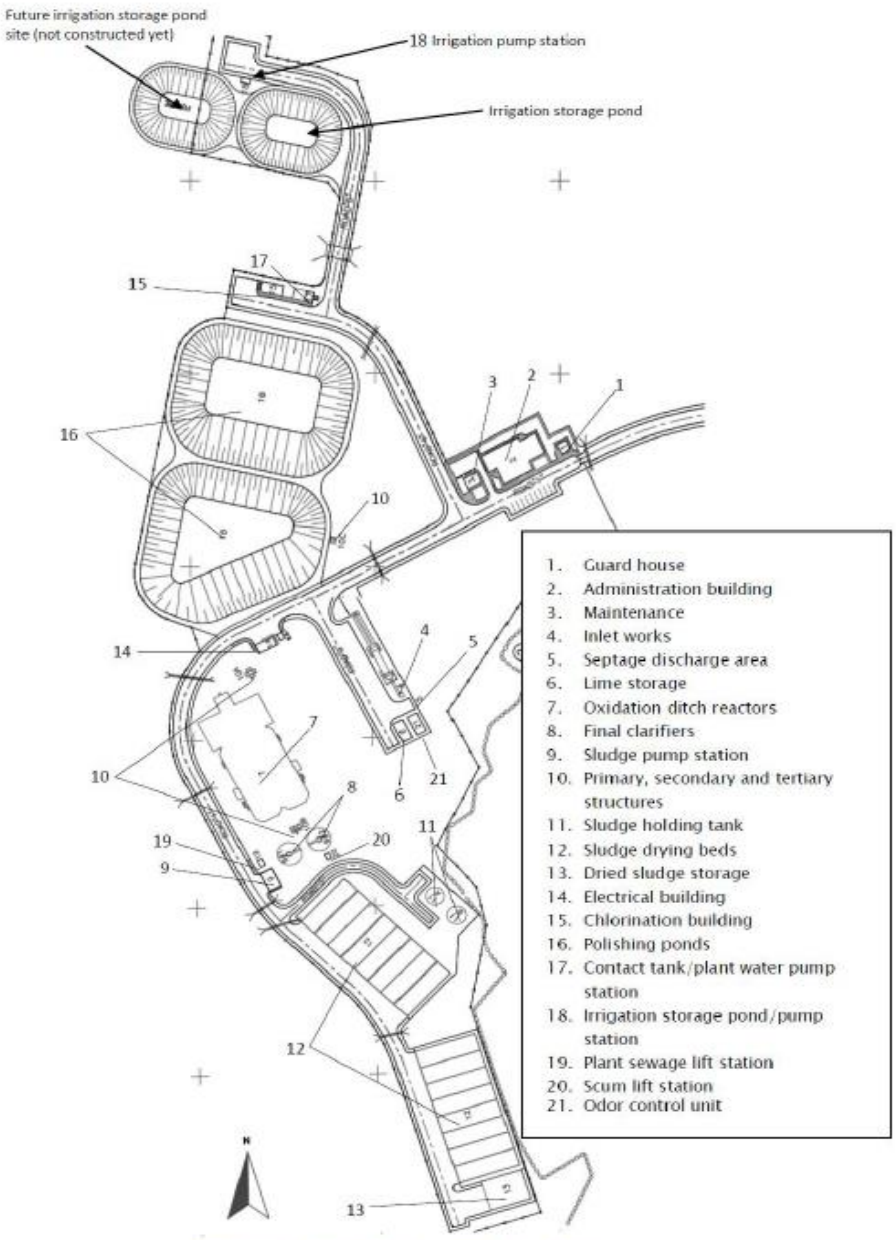

Figure 1: Wadi Mousa WWTP Site Layout

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Figure (1.1- A): Wadi Mousa WWTP Site Layout.

Figure (1.1- B): Proposed location for the Wadi Mousa Reuse Project

Current Wadi Mousa pilot project components are:

- 34 farm units
- Machinery
- Irrigation system (the filtration unit and irrigation systems)
- Project annexes (one horse and green house)

Farmers working at the pilot site are members of the ***Sad Al Ahmar Association*** also known as the Water Users Association (WUA) This association was established in January 2008 at Wadi Mousa, they will ultimately take over the responsibilities of managing farming issues following the end of the project when capacity building measures are completed.

There are 40 farm units within the pilot site, and as of September 2011, 26 farm units were fully utilized. The remaining farm units are partially utilized, while two farm units had ceased to operate. The association has 114 members (over 200 people including their families), of which about **40 members are directly engaged with the pilot project.** (***Beneficiaries/ Baseline***)

The first stage wastewater reuse pilot project consisted of 1069 Dunums, about 700 dunums is used in cultivation of alfalfa and fruit trees and winter fodder crops such as barley, 150 Dunums of these areas is cultivated with Barseem (fodder) ,

In addition to the above there are member farmers in the Sad Ahmar WUA Association who are waiting to participate in the project by converting some of the cultivated areas with winter fodder crops to be cultivated with Berseem because it is a cash generating crop.

It is estimated the land area that can be made available is 100 Dunums, and that what can be available in the pre-dedicated lands for the project. And as a result of increasing the productivity of the WWTP every year, this project will absorb the resultant water quantities until year 2016.

The **Petra Development Tourism Region Authority's (PDTRA**) orientation is towards expanding into the lands owned by the citizens in the north-east of the project and adjacent to the existing ww reuse site with area of 350 dunums and to be cultivated with fruit trees due to their need for small quantities of irrigation water, thus freeing the remaining quantities for Farmers use in Berseem irrigation.

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 dunums irrigated with reclaimed water) with the remaining 1331 dunums which are currently irrigated with rain or 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.

Proposed Project Objectives:

- The primary aim of this project is to develop the sustainability of reuse activities and on-farm integrated agriculture in Wadi Mousa.
- Integrate reclaimed water use in fodder production; fodder production will be used as sheep

feed. Feedstuff produced from each family holding (alfalfa and fodders) will be utilized to feed the flock.

- Propagation and redistribution of endangered plant species, medical and herbs plants production and beekeeping and honey production. whereby by becoming aggressive beekeepers, training selected farmers leaders to become experts on beekeeping production and to disseminate their knowledge to the rest of the community
- Optimize wastewater reuse for irrigated agriculture (alfalfa plantation areas) as a mean of climate change adaptation, install and replace drip GR-lines (useful life 5 years), maximize irrigated area through soil reclamation , and maximize the economic return per m3 of reclaimed water used for irrigation.
- Help establish integrated on-farm agriculture through the introduction of permaculture concept to the farmers.
- Develop effective propagation methods for important endangered and endemic native Jordanian plants. and protecting endanger Wadi Mousa native plants.
- Community resilience and adaptation to climate change through improved household generated income of poverty pockets and nomadic local Bedouin communities at Wadi Mousa.

Main Activities of the Proposed Project:

- **Reuse of reclaimed water in the production of fodder, fruit trees and natural trees**
  1. General maintenance work for the site existing pilot in terms of infrastructure
  2. maintenance of 50 Dunums of Barseem in the project
  3. Cultivate additional/new 100 Dunums with Barseem within the land of the first pilot project.
  4. Cultivate of 350 Dunums with fruit trees as a new expansion of the project.
  5. Cultivate length of 2 km with natural trees throughout the road leading to the station.

- **Livestock farming**
  1. Farming of 200 sheep fed on the fodder produced from the site
  2. Farming of 100 honey bee hives at the site.
- **Activation and operation of the Sad Ahmar Revolving Fund to serve farmers.**
- **Converting project products to easily marketable products:**
  1. Converting forage crops (alfalfa, barley, and corn) outputs resulting into pellets (establishment of a plant that converts forage to pellets)

2. Converting forage outputs (alfalfa barley corn) of the project into silage (Establishment of a plant that converts forage to Silage).
3. Process milk resulting from sheep to dairy products (through a dairy plant establishment).

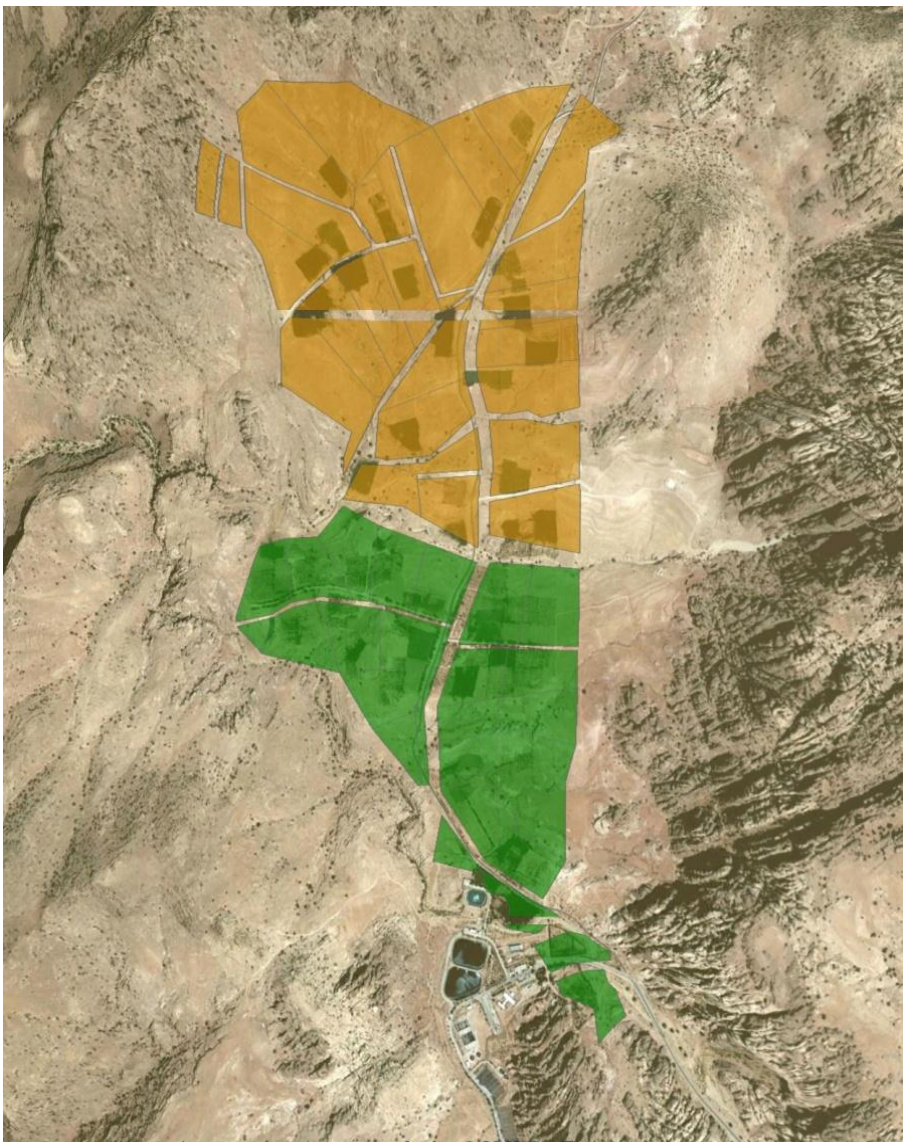

Figure (1.1-C): The Wadi Mousa Reuse Project, yellow area is the RIAL Pilot and green area is the proposed expansion under this proposed project

1. Wastewater Reuse for Fodder Irrigation:

Forty farmer plots need 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.(Refer to part B)

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.

Irrigation related activities include:

- Set guidelines for the irrigation schedules according to crop requirements and appropriate leaching factors
- Conduct a proper training plan that includes water management
- Assist farmers in understanding the importance of proper irrigation water management in their fields in order to avoid over-irrigating or under-irrigating their crops.
- Match each distribution valve pits' capacity to deliver irrigation water with the total area of plots and grown crops
- If necessary, make minor changes to the design of the existing irrigation network and if necessary, renumber all manholes and make necessary adjustments in the number of plots (addition, removal) receiving irrigation water from a certain manhole
- Monitor water meters installed at each farm to quantify water delivered to farmers' fields, and record the production of each crop
- Farmers and WUA are responsible for protecting and maintaining water meters located at the farmers' fields

Developing Wadi Mousa Project Database

To improve the management of the Wadi Mousa pilot project, a database including information about the irrigation system, farm units, and other relevant information will be developed. Expected benefits of the database are:

- Providing a platform to collect, organize, and manage information related to the Wadi Mousa pilot project.
- Identifying information gaps for future activities.
- Reducing time, efforts, and costs needed to collect data in the future.
- Creating one database which will allow for a centralized method of updating information.

A model database for Wadi Mousa will be developed. The database will be suitable for use in setting up new reuse pilot projects with a vision for long-term economic sustainability. Development of a model database will include the following activities:

- Conduct a field survey to collect data and establish a coding system for the project site
- Develop a farm unit coding system that links each farm to the farmer planting it. This part of the data base was finalized
- Assess the suitability of plots (according to soil depth, slope gradient and other topographic features such as rock-outcrops and stoniness) for proper allocation of crops. The signed agreements will clarify that the WUA of Sad Al-Ahmar and the (PDTRA) are responsible for collecting and analyzing soil and plant samples, in addition to conducting monthly reports of the

results. The data collected in accordance with the agreements would help populating the database.

Continue to Inspect the irrigation network to obtain information regarding:

- Maintain and keep updating the inventory list for all equipment and components of the irrigation network.
- Identification of damaged equipment and parts needed to fix the irrigation network.
- Maintain records and keep updating the layout of main lines, laterals, and manifolds.
- Develop maps that include actual farm areas and the layout of the irrigation system.
- Subcontract for the conduction of field surveys to collect information on socioeconomic status of farmers
- Subcontract for the compilation of information in the GIS, and also develop a simple spreadsheet-based database for the use by WUA
- Handover the database to (PDTRA) and WUAs NGO
- After developing the database, the GIS-based database could be handed over to (PDTRA) to facilitate the information sharing by whoever interested in water reuse issues. A simpler spreadsheet-type of database will be handed over to the WUA to systematically maintain and use the information for better future management of the pilot project going forward.

The project team will also assist in establishing activities within empty plots in the farms as follows:

- All empty plots would be cultivated, with alfalfa and other forage plants occupying at least 4 dunums per farm.
- In plots having substantial areas of rugged topography, saltbush plants (e.g. Atriplex halimus, Salsola vermiculata, and Panicum miliaceum) could be cultivated while direct grazing of the browse could be applied to save the costs of cutting and baling
- Wherever soil characteristics permit, crop rotation should be applied after termination of alfalfa stands. Typically, the rotation will be practiced every 4 years which is the normal average lifespan of alfalfa stands.
- It is suggested to plant Cactus trees as fences within the premises of the farms in order to separate plots used for rotating grazing activities and to delineate the farm's surrounding borders.
- Introducing new species to the area raises the need for investigating the environmental impact of having new species introduced to Wadi Mousa site, e.g. Eucalyptus trees. It is worth noticing that the WWTP has already planted Eucalyptus trees inside the WWTP area, and these trees are standing successfully.

The following outputs are expected from this respect:

- Maximize benefits through proper utilization of production
- Alfalfa plants reaching 25-50% flowering stage should be cut at a height of 8-10 cm above ground level to encourage re growth from the crown buds. Alfalfa is a multi-cut forage crop, and cutting is the best method to harvest the produced herbage.
- Harvest in the late fall to increase tonnage of alfalfa recognizing that young alfalfa stands survive winters better than older stands.
- Direct grazing of forage crops is usually not recommended because of the detrimental effect of grazing on alfalfa re-growth buds and the high potential of spreading weeds via animal droppings. However, the project will be seeking the advice of local experts and agronomists in order to reach the best combination of crops and native forage plants that will allow efficient and non- harmful grazing.

- Apply new storage and packaging strategies
- Information on how many tons of forage can be marketed in Wadi Mousa and the surrounding areas should be available before drafting different scenarios for marketing the produced forage.
- Making silage from produced forage is an option to conserve and market the surpluses of forage material. Farmers could be trained by The Jordanian Society for Organic Farming who is recently establishing a silage unit at Khirbet Al Samra area.

Training farmers and the WUA staff

The training plan for farmers will be developed in consultation with (PDTRA), local experts, and other stakeholders, and is expected to include the following topics:

- Protection of farmers and secondary users of the products from health risks associated with the use of reclaimed water
- Crop patterns and the mixed cropping of native grasses, trees and shrubs for forage uses
- Crop harvesting, proper packaging and storage methods to maximize the value of the crops
- Crop water requirements, irrigation efficiency, and salinity control
- Control of pests, weeds, and diseases
- Agricultural business planning

The training effort on hygienic and safe reuse of reclaimed waste water may be coordinated with the Ministry of Health (MoH). The training effort on cropping patterns, crop handling will be coordinated with the engineer from (PDTRA) and potentially with the Ministry of Agriculture (MoA) and the National Center for Agricultural Research and Extension (NCARE). Farmers at Wadi Mousa have been using reclaimed water for irrigation purposes for ten years by now. The farmers who received training can train other farmers at other reclaimed water reuse pilot projects in Jordan.

Intensive training may be provided for the young and educated farmer(s) who may become board member of the WUA technical assistance committee, to allow him/her to provide assistance to other farmers after the completion of this project.

The following activities are needed to develop the training:

- Consulting with farmers, WUA, and experts to determine the training needs.
- Preparing a training plan.
- Implementing the planned training sessions.

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Improving Hygiene by Establishing Access to Clean Water

For their safety, farmers were informed that the use of reclaimed water is strictly for irrigation and not for any other purposes. Cleaning, drinking, and washing require a clean water source. Farmers were trained by the RIAL project on the proper hygiene for handling reclaimed water. It is deemed necessary to have a source of clean, potable water near their farms to help farm workers abide by their training mandates. This project will provide the farmers in Wadi Mousa with a source of clean fresh water for hygienic purposes through construction of water less mobile toilets and water conserving wash facilities fitted with water saving devices.

Figure (1.1-D): waterless toilet

Detailed Activities that demonstrate Integrated Water Reuse with Farming Systems

A. **Livestock Farms**:

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.

The focus in these farms will be on sheep breeding and reproduction in addition to securing all facilities and equipments needed for that purpose.

1) **The availability of land for the project:** Available from association lands, this project requires five acres for farm establishment.
2) **Sheep Herding:** The project intends to raise 200 sheep; this number will increase gradually in the upcoming years through the annual birth of these sheep and so females will be added to the herds followed by males. The excess male sheep will be dumped after going under a fattening program for 2-3 months if revealed a weakness in breeding or was ill & is not affected by remedies and antibiotics.
3) **Managing the sheep herds and providing health care for them:**

- Good management for such projects is the most important element for the success or failure of any project. Moreover management must involve breeders, training them, giving them the required experience on the breeding processes through training courses, and also how to take care of sheep babies and protect them from cold and frost waves in addition to keeping them closer to their mothers during nursing. Moreover mothers must be well fed before mating season and during last month's of pregnancy in order to give birth for health babies with optimal weight.
- Providing food and water: It's not allowed to fatten mothers especially during pregnancy as it may lead to lower fertility rates. It is also very important to secure a safe source for drinking water specially that the current one is not safe. The amount of water needed for each sheep depends on the weather and the amount of water in food. For example: the amount of water needed in summer is more than that needed in winter, as well as the amount of water consumed if sheep were fed dry feed than if it consumed a liquid feed.
- Sports: Mothers must do enough exercises and movements during grazing in order to activate blood circulation and help them regulate the digestive channels. A special program is

arranged for pregnant sheep (especially in the last months of pregnancy) in order to prevent any risk of abortion, a pregnant sheep must be dragged for 15-30 minutes daily, and for the heavy moms that are close to give birth , the source of water must be at least 25-30m far.

- Health care: the internal and external parasites that may affect sheep wellness must be resisted.
- Shelters: an adequate shelter must be provided; suitable barns with umbrellas that protect sheep from rain and snow in winter as well as protect them from heat waves in summer.

Refer to Annex (1-A) for the detailed information on caring of Livestock & related Budget

B. Converting the products from the project into easy marketable goods.

- Convert all fodder crops project outputs like: (trefoil , barley and corn) into a pellet
- Build a factory which converts fodder into pellets.
- Convert all fodder crops project outputs like (trefoil , barley and corn) into silage
- Build a factory which converts fodder into silage
  convert milk from sheep into dairy products: Establish a small diary factory.

Converting produced fodder into feed grains

The current project produces around 1000 tons of green fodder annually, this number can be doubled in case of the upcoming expansion. It was found that the best way to market these products is to convert fodder into another form in which it's easy to store, transfer and sell in the in markets. In order to do this feed products as (trefoil, corn and barley) even grass should be dried and then put it in the machine to grind it after that send it to a mixer with water vapor , and then to another machine that convert the fodder into compressed grains, the product must be cooled and packaged in sealed plastics bags. These plastic bags must be labeled with basic information about this product, where it can be stored for a long time. This factory will contribute in increasing revenues & strengthening the association.

This small factory will consist of:

1- Drying trefoil completely at a rate of 3 tons/hour.
2- A spiral conveyor to transfer the product to the assembling warehouse.
3- Assembling warehouse made of iron (steel) 4 m2.
4- A spiral conveyor (4m) long to transfer the product.
5- Piston, mixer, energy regulator 3 tons/hour.
6- Boiler to supply piston with steam.
7- Elevator; to transfer the product to the refrigerator.
8- Refrigerator.
9- Sieve.
10- Elevator.

11- A 2 m2 warehouse.
12- Electronic scale.
13- Packing and sealing machine.
14 - Hangar 500.

The estimated cost for this factory is 65 000 JD (the installation included).

A small factory for converting green fodder into silage:

Silage is one of the most important forage that the Jordanian cow breeders import due to its high nutritional value compared to other products. And this factory will increase the revenues of the association by contributing to:

1-Solving farmer's marketing problem.
2- Increasing the nutritional value of the feed products.
3- Increasing the association's income.
4- Employ members of the association in the project.
5- Facilitating the storage and transport of these feed products.

This factory will operate on sending the product into machines that cut the feed with a certain rate of humidity, then transfer it to another machine which forms it as compressed oak ,weighing up to 50kg for each block then putting it into a plastic packaging machine which empty it from air and close it tightly.

This factory will consist of:
1- Shredder which cut trefoil under a certain rate of humidity and prepare it to the next stage.
2- Iron Warehouse of 4 m2.
3- A scale; to adjust blocks weight.
4- Piston, with 3 tons per hour power to convert the product into blocks with desired weight.
5- Packaging and Air-discharge machines.
6- Electric control panels for the entire site.
7- Hangar (200m).

The estimated cost for this factory is 38,000 JD.

C. Dairy Products Plant (small sized)

This Plant connects with the livestock and breeding of 200 sheep mentioned above , as there must be a unit for manufacturing milk products , which is a small (diary) plant. Women will be employed in this plant.

This plant consists of:

1-Milking tools and buckets for milk.
2-Special machines to transfer milk.
3- Refrigerators.
4- A small Pasteurization machine.
5-Filters for the milk (milk Incubators) .
6- Stainless steel Tables.
7- Milk shakers.

8-Manual tools, ovens, basins , cookers.
9- Caravan (50 m2) with walls and ground made of stainless
Pre-Fabricated hanger

Training and Education:

- Sheep breeding course.
- Beekeeping course.
- Public Health course.
- Feed manufacturing course.
- Restricted agriculture course for new farmers.
- An educational program for school and college students about the re-use of water.
- Printing posters and brochures

Office Supplies Needed: A meeting Room is Available

Office Tables	2
Computer Table	1
Laptop	1
Pickup for the Site	1
Chairs	12

Total establishment estimated cost~ 100,000 JD/for the first year.

D. **Breeding 100 beehives on site:**

Beekeeping has gained global importance, and has become a profession. There are hundred million types of bees that produce more than million tons of honey annually. Beekeeping spreads all around the world except in the poles & the African desert. The Increased demand on honey helps to spread this profession. In the last century Jordan has increased the activity of beekeeping which has extended to the private & public sectors. Beekeeping projects is considered one of the most economically feasible activities.

It's important to know that bees do not compete with other organisms for their food. They combine the nectar and pollen from flowers and convert it to food and medicine; It is also useful to know that bees are considered very important to some birds who feed on some kinds of flowers that do not bloom unless it is visited by bees.

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/yr. While from an 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.

Refer to Annex (1-B) for the Important nutritional, therapeutic benefits of bees products' component cost break down

2. 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 germplasm 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.

Plantation of Aloe Vera

This plant grows in valleys that is near to monastery and valleys which is destined from Kharrobeh Al-fajeh to Petra. It grows there because of the sandy soil which is nutrient-rich; the valleys that has deep soil. The fact that radical groups reproduce naturally in current

circumstances , so there must be an intervention in order to save this plant.

Aloe Vera can be planted as part of the expansion of the water re-use project, where participating farmers can cultivate their lands, so they can establish a small plant for producing the extract of Aloe Vera gel. And in order for the cultivation to be economically feasible, the farmers must establish a small nursery to reproduce this plant and also sell it to other farmers. The suggested space for this nursery is 50 acres to be expanded later on.

About 1069 dunums (106.9ha) are proposed to be fully 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.

In the current situation, only 50% of the wastewater effluent from the treatment plant is used and the remaining quantity is discharged to the valley, which makes it imperative to make use of the extension at the agriculture to absorb the now and future remaining quantities of water, the current water needs for the project reaches to 522005 meter cubic.

Petra waste water treatment plant was designed to treat municipal wastewater from four village pumping stations covering (Al Tybah, Wadi Mousa , Al Bdoul ,and Al Byda) the design capacity of

the station is 3400 meter cubic /day with organic loading (BOD) of 500mg/l and total suspended solids (TSS) with average 500mg/l also the station has a special utilities for receiving waste water from cesspools transported by tanks.

The treatments process is consisted of the primary stage, the secondary stage and the denitrification, treatment of sludge and effluent chlorination. The treated water results from the WWTP is of a high quality and is used now in the reuse project by the local farmers for irrigation.

From the table below it is clear that the excess wastewater production should be invested for fodder production or natural and fruitful trees including the needed:

1- General maintenance work for the site in terms of infrastructure
2- Maintenance of 50 Dunums utilized currently for fodder (Barseem) in the project
3- Cultivate new 100 Dunums with Barseem within the land of the first pilot project.
4- Cultivate of 350 Dunums with fruit trees as a new expansion of the project
5- Cultivate the length length of 2 km with native trees along the main road leading to the WWTP.

Table (1.1- C): The WWTP effluent quantity production throughout the period from 2003 to 2013 is as shown below:

Year	Average Annual output
2003	292000
2004	438000
2005	547500
2006	638750
2007	711750
2008	818330
2009	904470
2010	1065435
2011	896805
2012	920530
2013	991705

*: All executing entities should include the core indicators in the project performance Reports (PPRs), Refer to Annex (3), to view the methodology for documenting these indicators or visit (https:www.adaptation-fund.org/policies_guidelines)

N.B 1: By eliminating immediate financial burdens and following up with additional technical assistance, the pilot project operation is expected to generate a surplus of funds that is adequate to sustain the pilot project financially. The immediate grant request also includes the cost associated with the development and implementation of training sessions.

To view the General infrastructure Maintenance needs refer to Annex (1-B)

NB. 2: **For the detailed & estimated breakdown of Costs for Irrigation System Rehabilitation for Wadi Mousa Pilot Project please**

Timeline for Activities:

The timeline for activities of the proposed work plan is presented in the following Table.

Project (1.1) Activities at Wadi Mousa WWTP	Duration (Months)																
	2015				2016				2017				2018				2019
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Jan
1) General infrastructure and Maintenance needs of the WWTP																	
2) Maintenance for the existing 50 Dunums cultivated with Barseem																	
3) Cultivating 100 new dunums with Berseem inside the lands of the first project																	
4) Expansion of the Project Area																	
5) Livestock Breeding																	
6) Beekeeping and honey production facility																	
7) Irrigation System Rehabilitation																	
8) Cultivation of Native Trees along the road to the WWTP																	
9) Plantation of Medical Plants Aloe Vera & Gel extraction plant																	
10) converting green fodder into silage plant																	
11) Converting produced fodder into feed grains																	
12) Dairy Products Plant small sized																	

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.

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.

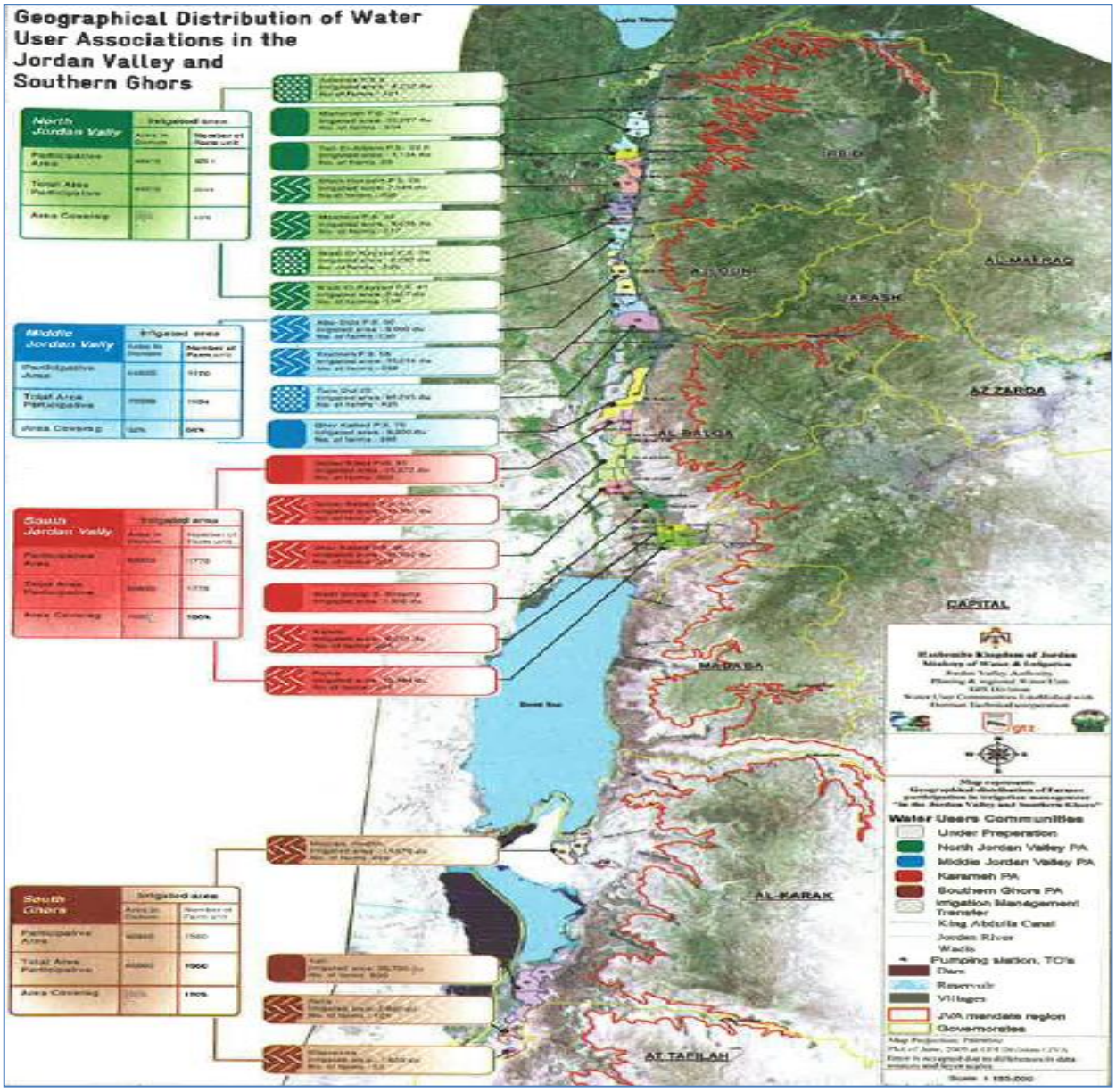


Figure (1.2.1): Map of the locations of the Water User Associations (WUA).

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.

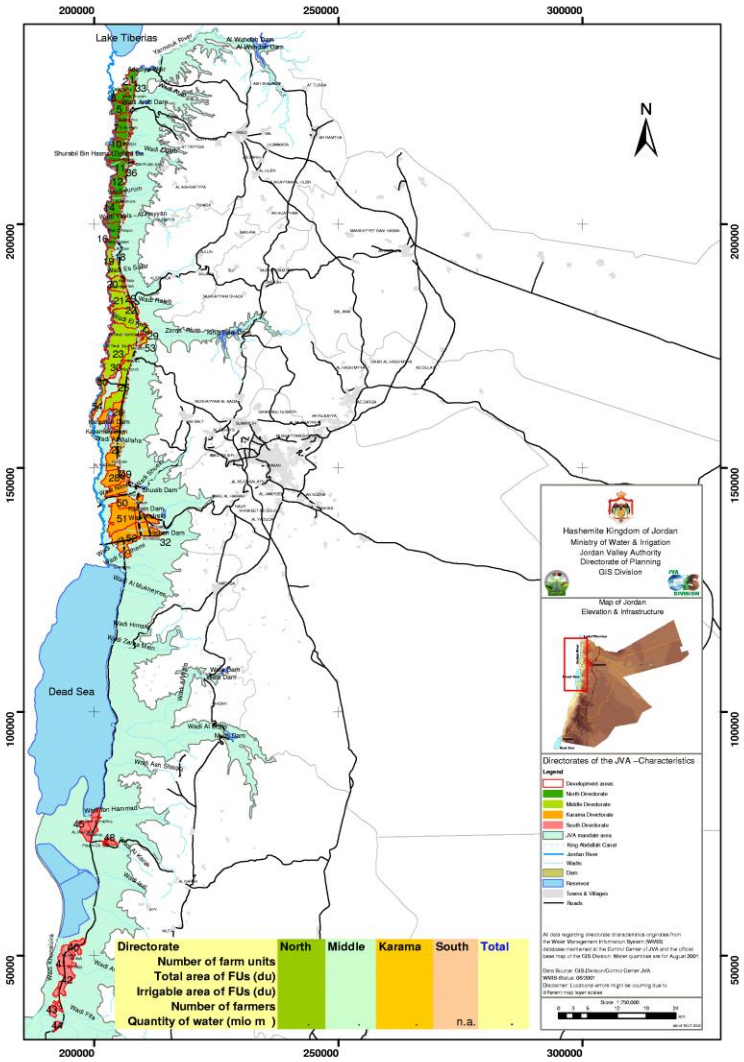


Figure (1.2-A): Map of the four geographical regions of Jordan Valley & farm units.

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

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.

Project Management activities:

- 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 through.RSS, JFDA and JVA
- 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.

Timeline of Activities

Project (1.2) Activities @ Northern Jordan Valley WWTP	Duration (Months)																
	2015				2016				2017				2018				2019
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Jan
1) General rehabilitation and upgrading of on farm irrigation infrastructure and maintenance of the systems																	
2) Install the best available technology of water filtration systems **(on a cost share basis by the farmers)**																	
3) Introduce water treatment and softening technology(ies) **(on a cost share basis by the farmers)**																	
4) Technical Assistance Support through:																	
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																	
Implement a comprehensive soil survey in relation to soil quality, baseline data and soil salinity																	
Soil salinity management and according to climatic data, plan for best soil management and leaching practices																	
5)Water quality monitoring (both micro-biological as well as selected physio-chemical parameters) are to be enforced and supported with ISO 17025 laboratories accreditation																	
6) Installation of new Irrigation System																	

Project Expected Results Outcome/Output	Indicators	Baseline	Target
Outcome1: Increased water availability and efficient use through wastewater reuse **Output 1**: Quantity (m3) of Supplementary water available for agriculture as a result of wastewater reuse	**Quantity of Available treated Wastewater per the national water master Plan**	**17 Million Cubic Meter ***	**20 Million Cubic Meter**
	Treated wastewater contribution to the total irrigation water supply	**20%**	**27%**
	Increased income, or avoided decrease in income	**Varies according to farm size and product**	**20% increase**
Outcome 2: Increased adaptive capacity within relevant development and natural resource sectors **Output 2:** Number of farms/hectares using the water supply for supplementary irrigation	**Natural Assets Protected or Rehabilitated** (Current irrigated area	**5,520 Hectare**	**5,520 Hectare " Expansion of irrigated area is not allowed by JVA, However changing cropping patterns is recommended**
Outcome 3: Strengthened awareness at local level **Output 3:** Targeted population groups participating in adaptation and risk reduction awareness activities	**Number of beneficiaries**	**16 targeted farming groups Development Areas "DA"(3to11), (33-36) North Ghors population 106680**	**30 Farming Groups with JVA task transfer based on enhanced awareness level of local famers**

Project (1.3) Tal El Mantah Wastewater Treatment Plant Project Wastewater Reuse

Figure (1.3-A): The Tal Mantah WWTP

Investigation of the WWTP area showed that there is no sanitation & wastewater network to serve the community, also it was found that the majority of land is used for agricultural purposes. The wastewater treatment plant is based on the mechanical & natural treatment methods, the total area available for this project is around 420 Dunums , currently only 25 Dunums are being used for the wastewater treatment station, the rest of land is utilized for agricultural activities which depends on the treated waste water for irrigation. The WWTP has a design capacity to treat 1200m3/day of sepatge wastewater, but current capacity is 600-800 m3/day. Currently it is receiving 400m3/day. 150 dunums is available for wastewater reuse. This facility can serve around 30,000 people which is about 25% of the total population in Jordan valley.

In the sepatge tanks reception unit a sample is collected from the wastewater influent discharged by the tankers, and the source of this wastewater is verified weather it is of (Domestic, Industries, Hospitals, or Olive mills). Wastewater from olive mills is not allowed to enter the facility as its not designed to treat such influent.

The waste water is treated to meet the technical standards of the reuse of wastewater for irrigation purposes. The Effluent coming out of the biological treatment unit runs to a chain of polishing ponds which encompasses wastewater treatment units called (wetland), that are used

for further treatment of the wastewater, these units have biomass (reed bed plants) that get their food from the nutrients in the wastewater like (Nitrogen & phosphorus). After some period of time these plants are harvested and reused in making an organic fertilizer or is given as animal feed.

Figure (1.3-B): View of the WWTP at Tal Mantah

Figure (1.3-C) Septic Tank emptying to the WWTP Headworks

Project Objectives:

- To find a sustainable, efficient and low cost solution for treating waste management that would improve public health, the surrounding environmental habitat in Jordan Valley which is currently deteriorating due to insufficient and inadequate management of waste.
- Design a holistic project which enable and engage local communities in the management of solid waste.

Project Activities:

Evaluate the quality & suitability of the reuse pilot soil for the future plantation of different types of crops, through laboratory analysis to ensure compliance with FAO and Jordanian pertinent regulations and standards.

- The preparation of wide areas of land to be ready for plantation with either fodder, forest and productive tree species such as date palms in the project area.
- A very important activity of this project is to spread environmental awareness and work on changing wrong attitudes and perceptions towards treated wastewater and ww treatment facilities to irrigate crops.
- There is a possibility of extension & expansion of the station from 400 to 800 & 1200 Cubic meter per day in a phased approach.
- Moreover the project intends to convert & treat the sludge to organic fertilizers which will be used for this project or any other activity outside in the surrounding lands.
- The construction of drying ponds & the removal of sand from the plant head works, with the addition of a grit removal chamber.
- The installation of a tertiary irrigation network and a filtration unit.
- The rehabilitation of the adjacent building to the WWTP to be used as a knowledge & training center for the water user associations (WUA) in the middle Jordan Valley.

Figure (1.3-D): Proposed Wastewater Reuse Pilot Land Plot.

Figure (1.3.-E) WUA /Visitor Knowledge Centre to be Rehabilitated

Timeline of Activities:

Project (1.3) Activities at Tal Mantah WWTP	Duration (Months)																
	2015				2016				2017				2018				2019
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Jan
1) Rehabilitation and maintenance of Tal El Mantah WWT plant*																	
2) The rehabilitation of the adjacent building to the WWTP to be used as a training center& lab testing																	
3) Install the best available technology of water filtration systems (on a cost share basis by the farmers)																	
4) Introduce water treatment and softening technology(ies) (on a cost share basis by the farmers)																	
6) Installation of new Irrigation System																	
Soil salinity management and according to climatic data, plan for best soil management and leaching practices																	

Strategic Results Framework

*: All Implementing entities should include the core indicators in the project performance Reports

Project Expected Results Outcome/Output	Indicators	Baseline	Target
Outcome1: Increased water availability and efficient use through wastewater reuse **Output 1**: Quantity (m3) of Supplementary water available for agriculture as a result of wastewater reuse	**Number of target Beneficiaries (currently there is no ww reuse generated by population of 18,000**	**0**	**Deir Alla including Karama 58710 South Shouneh 48960**
	Quantity of Supplementary water available for agriculture	**400 ,000 m3 currently not being utilized**	**800,000 m3 meter through population growth & phased WWTP expansion approach**
	Natural Assets Protected or Rehabilitated	**WWTP at Tal Mantah needing minor infrastructure rehabilitation**	**Full design capacity at 1200 m^3/day**
Outcome 2: Increased adaptive capacity within relevant development and natural resource sectors **Output 2:** Number of farms/hectares using the water supply for supplementary irrigation, # Assets Protected or Rehabilitated	**Natural Assets Protected or Rehabilitated**	**0 area being irrigated with TWW**	**150,000 m^2**
	Assets produced, Developed, Improved or strengthened	**Farmer/WUAs Training facility needing rehabilitation**	**Fully operational & utilized Farmer/WUAs Training facility**

(PPRs), Refer to Annex (3), to view the methodology for documenting these indicators or visit (https:www.adaptation-fund.org/policies_guidelines)

(1.4) Wastewater Reuse at North Shouneh WWTP

Overview of the potential service area (source ECODIT-USAID Consulting Firm)

North Shouneh ('Shouneh Shamaliya'), has a population of over 15,000 people, and is one of the largest towns in the Northern Jordan Valley (NJV). It is part of the Municipality of Mu'ath Bin Jabal, the northern most municipality of the Jordan Valley with a total registered population of over 30,000 people.

Other municipalities in the NJV also include the Municipality of Tabqit Fahel, just south of Mu'ath

Bin Jabal (MBJ), and the Municipality of Sharhabeel Bin Hasna that is the furthest south. Tabqit Fahel has over 27,000 registered people and includes towns such Mashari and Sheikh Hussein. Sharhabeel Bin Hasna has over 28,000 people and includes towns such as Wadi Al Yabis, Abu Sido and Kraymah, the southern most town in the NJV.

The NJV is in one of the lowest places on earth, with elevations ranging from 200 m below sea level (or - 200 asl) in the northeast, down to –300 m asl southwest of Kraymah. Immediately to the east of the area is the foothills of the Jordan Valley Escarpment, where elevations first increase at a rate of about 100 m every 1 km, then level out a gradually until getting to Irbid, which is at around 600 m asl. North Shouneh is one of the warmer places in the Kingdom with mean monthly temperature ranging from 13^0 C in the winter reaching upper 30^0 C in the summer.

Population density is relatively high in some of the larger town-centers such as North Shouneh, but is less so in other smaller residential areas. Residential space is quite limited in the NJV since the valley falls within a narrow strip of highly agricultural lands surrounded by steep hills to the east and the Jordan River to the West. The area borders Syria to the North and the Occupied Territories / Israel to the West. In the hills to the east, the NJV is bordered by the Municipalities of Taybeh and Kura that are home to over 100,000 people.

The WWTP, is with a design capacity of 1,200 m3/day, designed to receive septage from Mu'ath Bin Jabal Municipality and nearby communities through to 2028, when the Municipality's population is expected to exceed 46,000 people. Before 2028, the WWTP will be able to accept septage from a wider service area, servicing most communities of the Northern Jordan Valley during the earlier years of operation.

The treatment technology includes multiple concrete settling / anaerobic basins operating in series, dedicated denitrification tanks, facultative lagoons, re-circulating sand filters and constructed wetlands all of which were recently constructed by USAID and completed during 2014 to comply fully with the JS 289/2006. All treated wastewater will be used at the site or sold to farmers. Therefore there will be no discharge to wadis.

Objectives of the Project:

- Strengthen climate change adaptation, water and environmental institutions and policies pertaining to wastewater treatment and reuse;
- Demonstrate the efficiency and cost-effectiveness of appropriate technologies for the treatment and reuse of domestic wastewater in rural areas (construction of facilities under a

separate contract);

- Promote the participation of local and national governments, local community groups, NGOs, the private sector, and professional associations, individually as well as collaboratively, in planning, developing, implementing and operating sustainable local solutions to the problems of raw sewage discharges and irrigation water scarcity.

Activities of the project

There is an overall preference for reuse alternatives to remain flexible. During the scoping session, there was almost unanimous agreement to combine three reuse alternatives:

- Provide TWW to farmers in the vicinity of the WWTP;
- Provide TWW to farmers and other users far from the WWTP; and
- Reuse TWW as part of (or ancillary to) the WWTP operations.

Quantities of effluent available and on-site land availability will be a limiting factor in determining the precise combination. A preference was expressed by stakeholders for using the TWW on-site as demonstration and an opportunity to generate more income for the WWTP or organization involved (e.g. municipality). With more confidence in TWW reuse and the quality of effluents, then farmers in the vicinity of the WWTP would become the first priority. In the event that it was needed, disposal of TWW to *wadis* (or the Jordan River) was not perceived by most local stakeholders as a major obstacle, perhaps even beneficial to the River's water quality.

Transfer to other areas - via canals was also suggested as an option, as was mixing the TWW with fresh supplies for distribution with the irrigation system. Many also suggested using TWW to irrigate trees/forests in and around residential areas (to help reduce temperatures) or to support municipal projects (e.g., parks). The most likely crops to be irrigated, at least in the short-medium term, include forage crops, trees and palm trees, with the possibility of irrigating citrus in the future.

Timeline of Activities

Project (1.4) Activities at North Shouneh WWTP	Duration (Months)																
	2015				2016				2017				2018				2019
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Jan
1) Using TWW to irrigate stone fruit trees in and around residential areas																	
2) Install the best available technology of water filtration system to polish the effluent before distribution for reuse																	
Introduce water treatment and softening technology(ies) (on a cost share basis by the farmers)																	
Install on farm irrigation infrastructure for farmers in different locations around the vicinity of the pilot and surrounding farms (on a cost share basis by the farmers)																	
3) Technical Assistance Support through:																	
Support the farmers in the northern Shouneh to adapt to new water quality (wastewater) 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																	
A comprehensive soil survey is recommended in relation to soil quality, baseline data and soil salinity																	
Water quality monitoring (both micro-biological as well as selected physio-chemical parameters) crop, soil and water quality monitoring through.RSS, JFDA and JVA																	

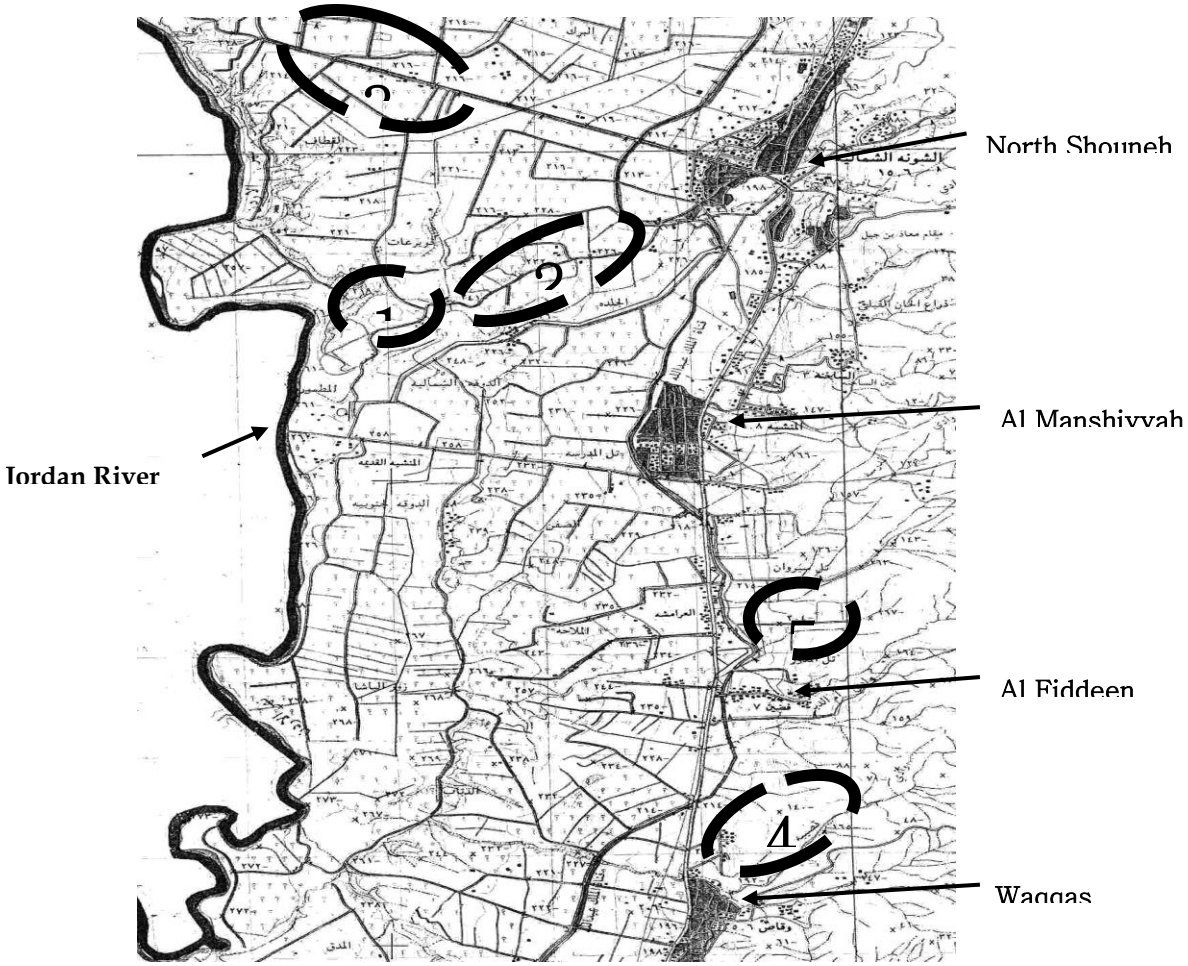


Figure (1.4-A): Location of North Shouneh WWT

*: All Implementing entities should include the core indicators in the project performance Reports (PPRs), Refer to Annex (3), to view the methodology for documenting these indicators or visit (https:www.adaptation-fund.org/policies_guidelines)

Table (1.4-A): Strategic Results Framework

Project Expected Results Outcome/Output	Indicators	Baseline	Target
Outcome1: Increased water availability and efficient use through wastewater reuse **Output 1**: Quantity (m3) of Supplementary water available for agriculture as a result of wasewater reuse	**Number of beneficiaries current served population by WWTP is** 15000 Persons	**0**	**Deir Alla including Karama 58710**
	Quantity (m3) of Supplementary water available	**0 m3/day**	**1200 m3/day**
	Increased income, or avoided decrease in income	**0 as no reuse is taking place**	**300 $/household/ month**
Outcome 2: Increased adaptive capacity within relevant development and natural resource sectors **Output 2:** Number of farms/hectares using the water supply for supplementary irrigation	**Assets produced, Developed, Improved or strengthened**	**0**	**80,000 m^2**
Project Expected Results **Outcome/Output**	**Indicators**	**Baseline**	**Target**
Outcome1: Increased water availability and efficient use through wastewater reuse **Output 1**: Quantity (m3) of Supplementary water available for agriculture as a result of wasewater reuse	**Number of beneficiaries current served population by WWTP is** 15000 Persons	**0**	**Deir Alla including Karama 58710**
	Quantity (m3) of Supplementary water available	**0 m3/day**	**1200 m3/day**
	Increased income, or avoided decrease in income	**0 as no reuse is taking place**	**300 $/household/ month**
Outcome 2: Increased adaptive capacity within relevant development and natural resource sectors **Output 2:** Number of farms/hectares using the water supply for supplementary irrigation	**Assets produced, Developed, Improved or strengthened**	**0**	**80,000 m^2**

Rain Water Harvesting:

Project (1.5) Community resilience and adaptation to climate change through water harvesting technologies in poverty pockets

Background: Water is a vital resource for crop production in rain fed-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. Harvest drain water is a renewable source of clean water that is ideal for agriculture in rainfall water short seasons.

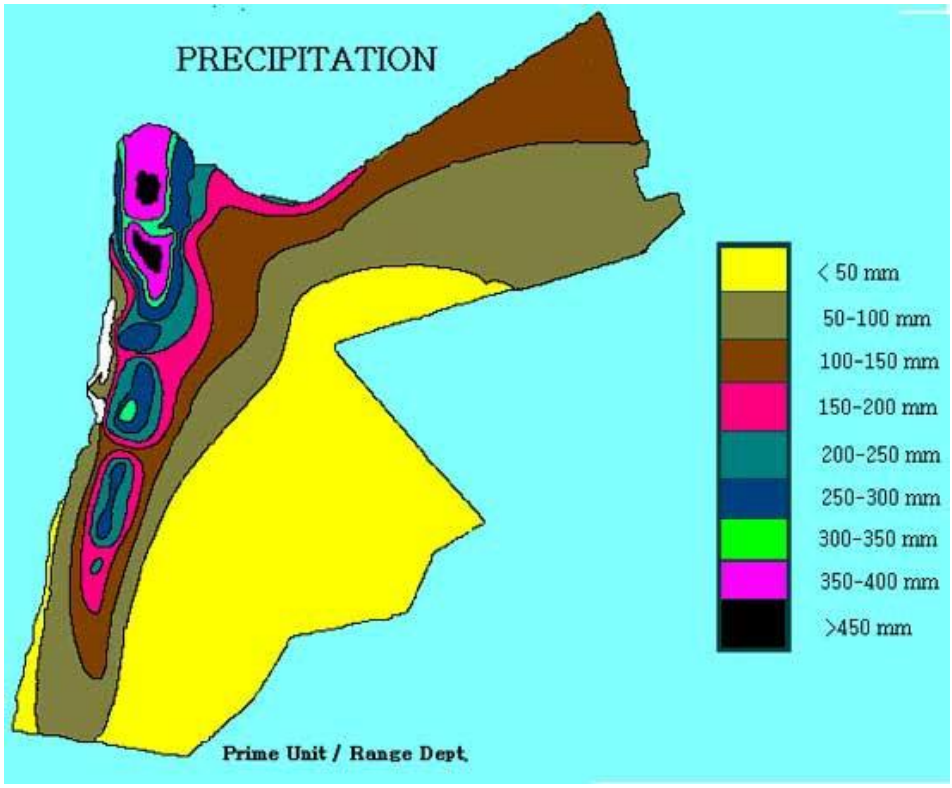


Figure (1.5-A) Average annual rainfall in Jordan

Refer to Annex (4) to view Jordan's rainfall depth and its distribution over the different zones.

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 (1.5-B): 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.

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.

Project 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 and Fifa 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/khnaizerah and Fifa are 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, khnaizerah / and Fifa 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.

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 ground and surface water resources
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.

Standards that will be followed for the rainwater harvesting component: Jordan has a strong enforcement system that calls for compliance with pertinent laws such as those related to water, labor and public safety, modern construction 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 that a certain project or activity may have a negative impact and needs to be regulated. Minsitry of Public Works and Housing awards construction contracts.

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.

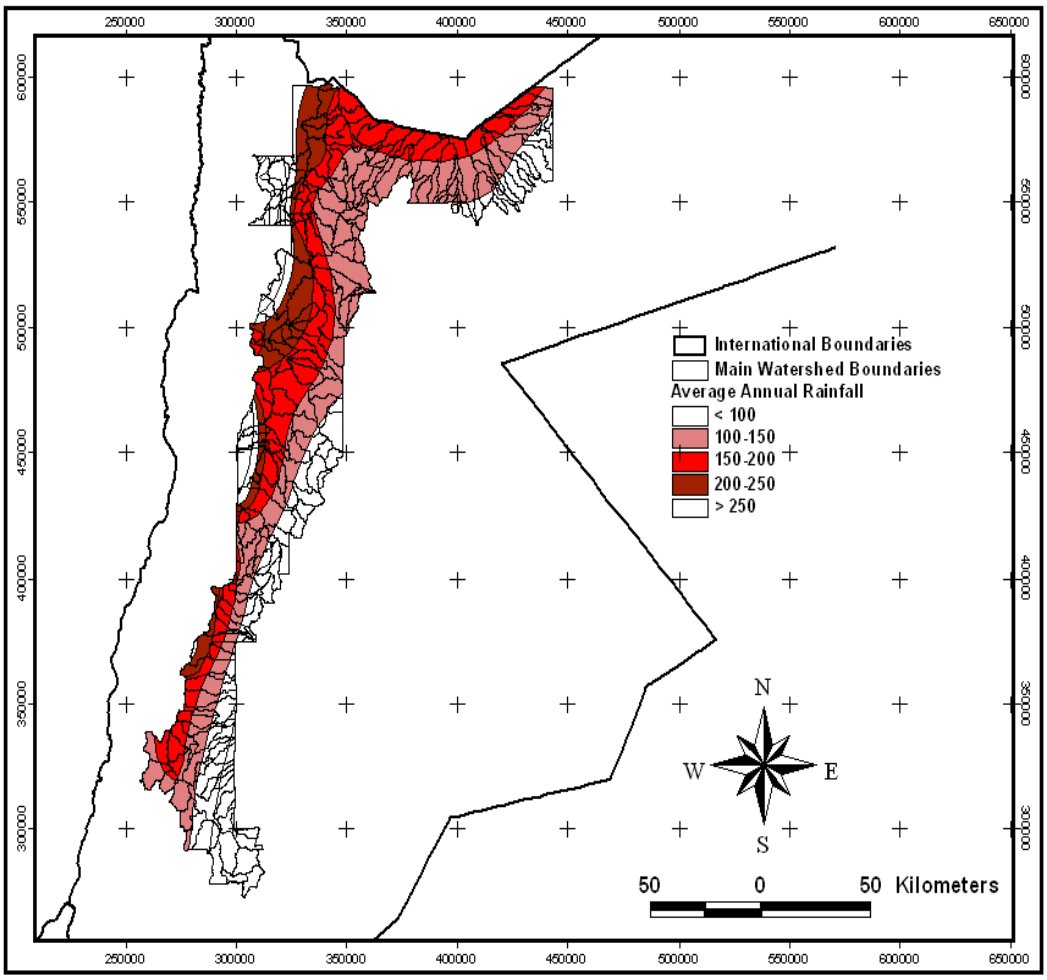


Figure (1.5-C): The rainfall isohyetal map with defined watershed boundaries that are located within the 100 – 250 mm rainfall zone. This area (13600 km^2) comprises 15.3% of Jordan's land area.

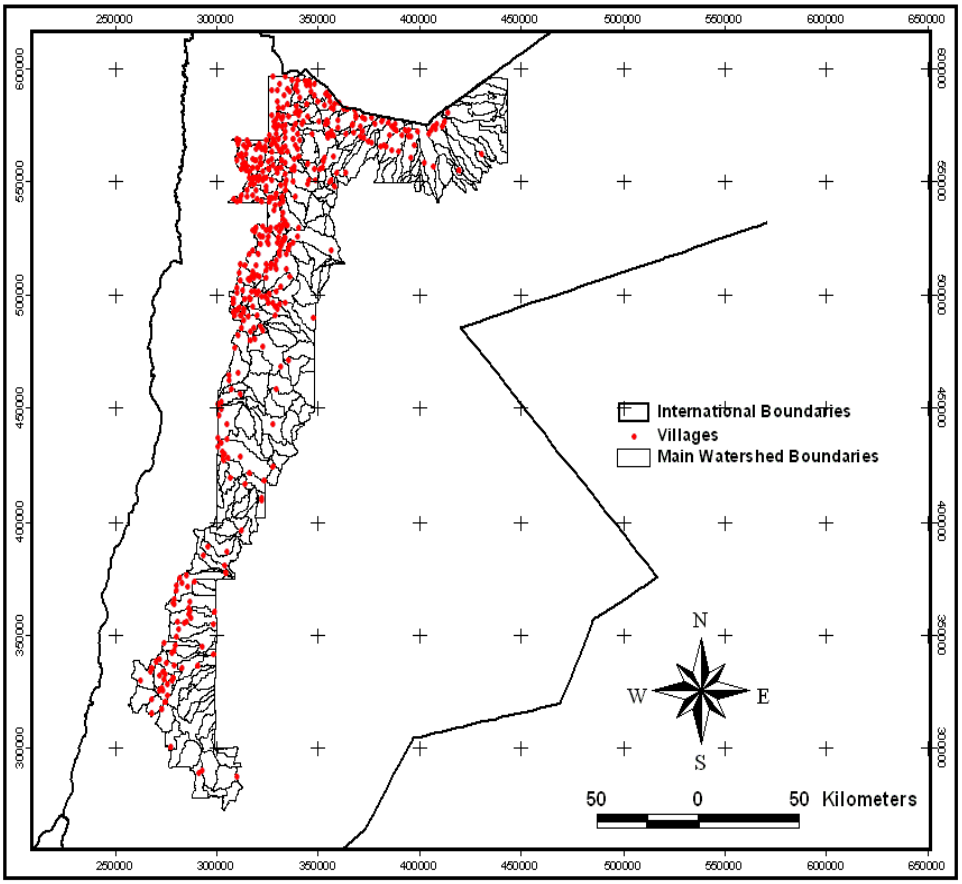


Figure (1.5.-D): The distribution of villages and communities in the selected zone.

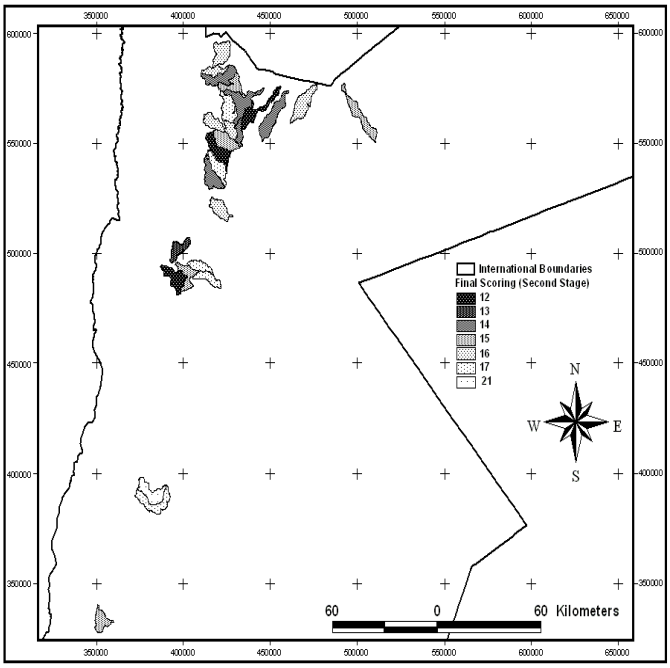


Figure (1.5-E): Final scoring stage for the selection of suitable watersheds.

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, GhorHadeetheh, khnaizerah 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.

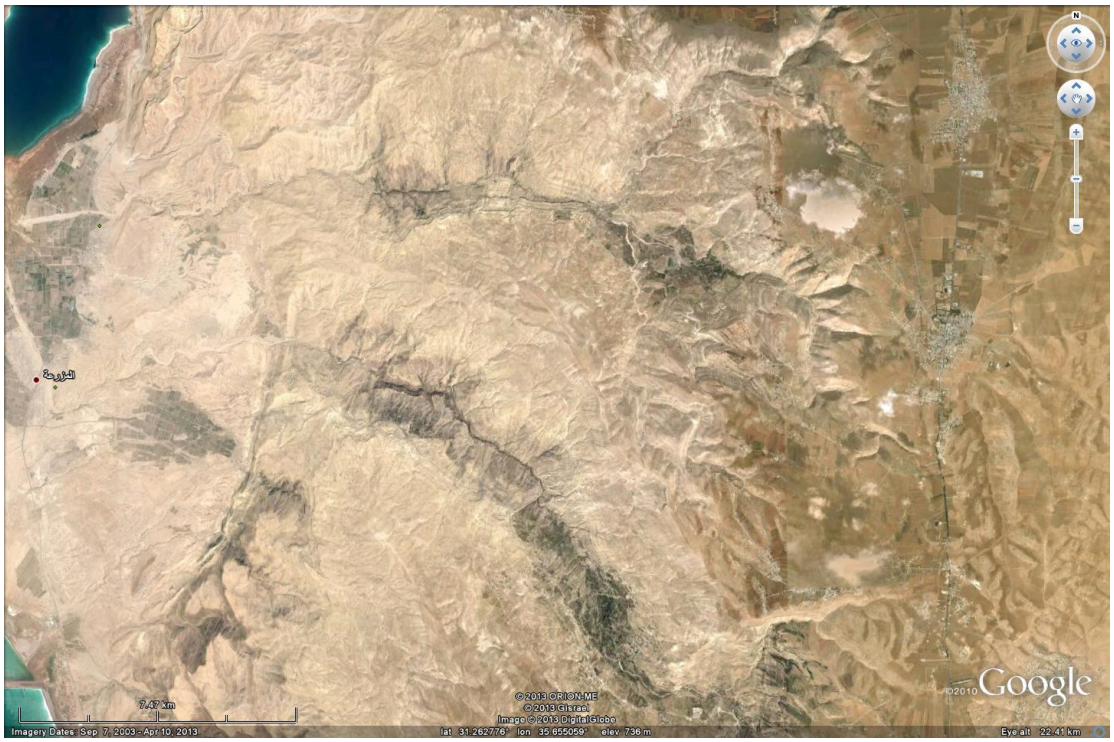


Figure (1.5-F): Google Earth image for Ghor Hadeetheh, khnaizerah and Ghor Al-Mazra'a watersheds.

Figure (1.5-G): Google Earth image for Ghor Al-Safi watershed

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.

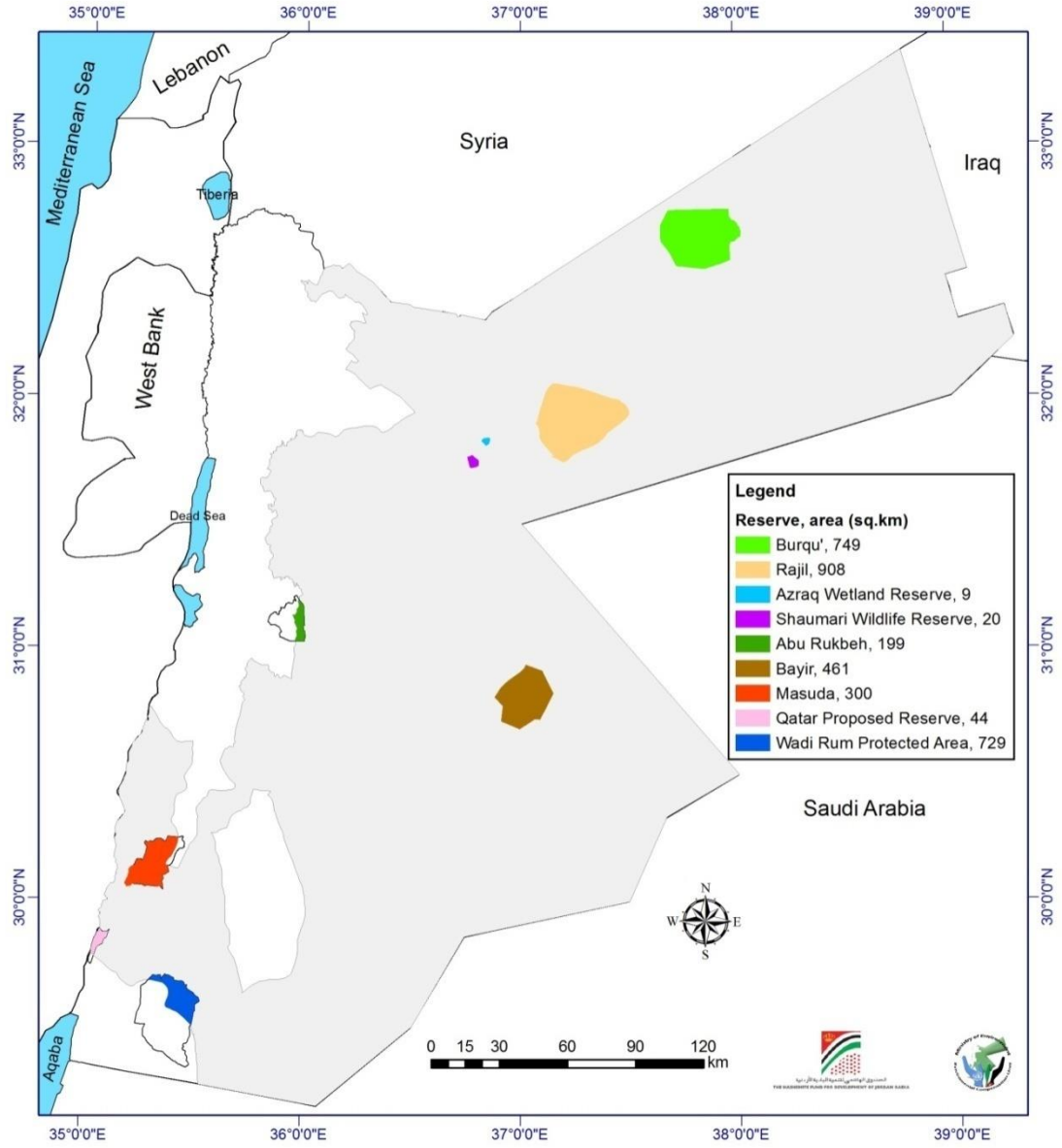


Figure (1.5-H): Potential watersheds in the Badia region of Jordan.

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.

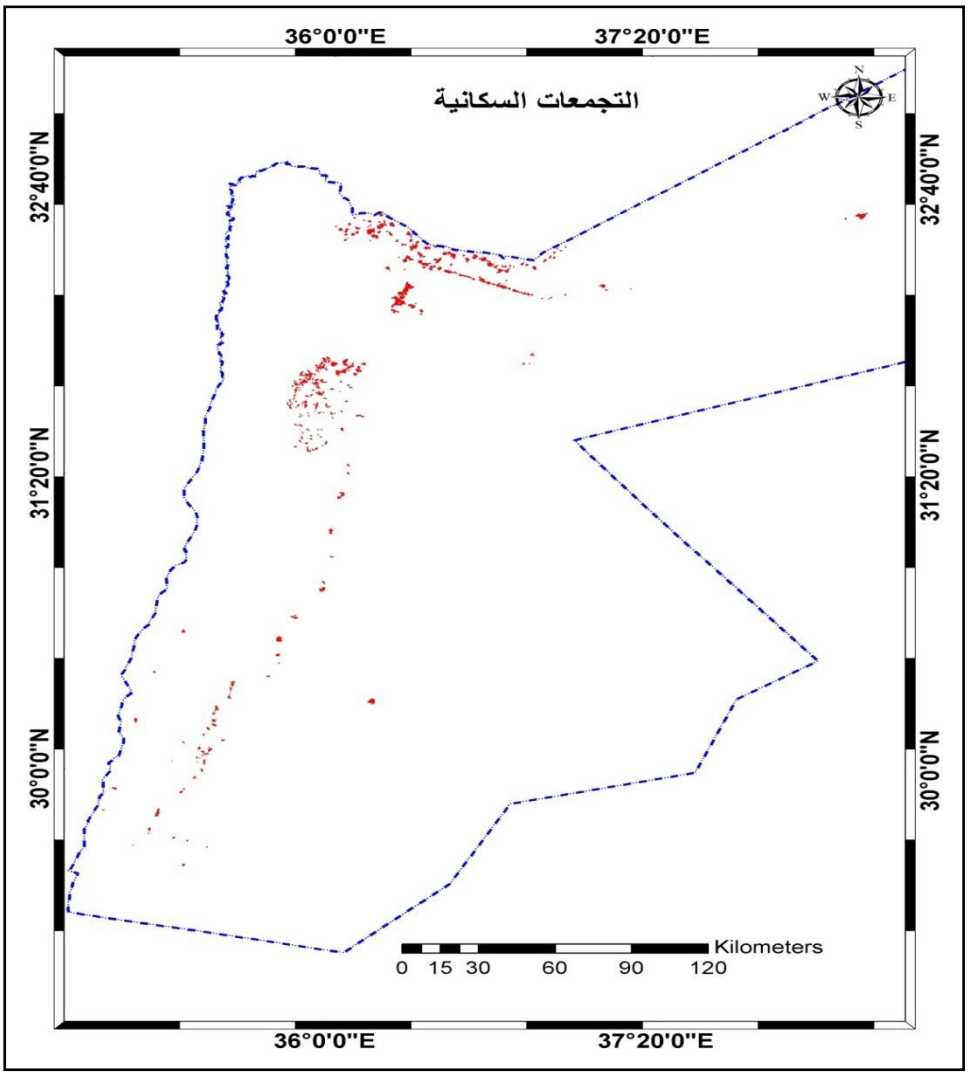


Figure (1.5-I): Localities and their proximity to water harvesting projects

Project Activities:

- 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 ground water recharge and provide water for pastoral use and assist remote Beduin communities become more resilient to climate change .

Timeline of Activities

Project (1.5) Activities Rain Water Harvesting Technologies	Duration (Months)																
	2015				2016				2017				2018				2019
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Jan
1) Obtain scientific data on rainfall data and rainwater harvesting potentials in the Mazraah/Haditha/Fifa Region																	
2) Prepare engineering design and feasibility studies for potential earthern dams in region																	
3) Construction of a rainwater harvesting earthern dam in khanzeerah arae																	
4) Training & Involving communities in planning and managing their watershed.																	
5) Water quality monitoring (both micro-biological as well as selected physio-chemical parameters) by JVA labs																	
6)Rehabilitate and install where needed new irrigation and filtration systems on farms																	

Strategic Results Framework

Project Expected Results Outcome/Output	Indicators	Baseline	Target
Outcome1: Increased water availability and efficient use through Rainwater Harvesting **Output 1**: Quantity (m3) of Supplementary water available for agriculture as a result of Rainwater harvesting	**Number of beneficiaries (current population 30,827)**	**0**	**<u>Number of Population</u> Ghor Al-Safi 24580 Ghor Ma'zraa 15890**
	Quantity (m3) of Supplementary water for summer irrigation of vegetable crops	**0 (currently no rainwater harvesting is taking place)**	**300,000 m3/yr**
Outcome 2: Increased adaptive capacity within relevant development and natural resource sectors **Output 2.1:** Number of farms/hectares using the water supply for supplementary irrigation **Output 2.2:** - Amount of Vegetable produced in (Kg / Year)	**Increase in Income due to increased production of vegetables**	**0**	**$2000/farm plot**
	Assets produced, Developed, Improved or strengthened	**0 no rainwater collection earthern dam**	**One (New Khnaizerah rainwater collection dam)**

*: All Implementing entities should include the core indicators in the project performance Reports (PPRs), Refer to Annex (3), to view the methodology for documenting these indicators or visit (https:www.adaptation-fund.org/policies_guidelines)

Project (1.6): Climate Change Adaptation, Building Resilient Food Security Systems through Extending Permaculture Design and Technologies in The Jordan Valley and Beyond.

The challenges facing the dry areas, especially in the developing world, where food Insecurity is already a major concern is massive. The dry areas of the developing World occupy some 3 billion hectares, and are home to one third of the global population. About 16% of the population lives in chronic poverty, particularly in marginalized rain fed areas. Characterized by water scarcity, the dry areas are also challenged by rapid population growth, frequent droughts, high Climatic variability, land degradation and desertification, and widespread poverty.

Adopting permaculture and agro-ecological techniques for Land use, and extending the appropriate technologies, E.g. : broad acre and small scale water harvesting techniques, recycling of biomass, dry lands farming strategies, and small scale urban farming and food forestry projects have multiple benefits summarized in the following :

Since it uses a whole system approach, it generates a stable future adapted and profitable investment. It uses biologically fixed nitrogen, i.e avoids the multiple ills of synthetic nitrogen as: destruction of soil organic matter, high energy use, environmental pollution etc. It also help maximize soil Health in particularly organic matter levels;. Minimize the use of external inputs such as fertilizers, fossil fuels, and biocides, also it reducing the exposure to cost increase (of previous inputs) and their negative impact on farm profitability

Permaculture is a branch of ecological design, ecological engineering, environmental design, construction and Integrated Water Resources Management that develops sustainable architecture, regenerative and self-maintained habitat and agricultural systems modeled from natural ecosystems.

The word permaculture originally referred to "permanent agriculture" but was expanded to stand also for "permanent culture," as it was seen that social aspects were integral to a truly sustainable system.

Permaculture design emphasizes patterns of landscape, function, and species assemblies. It

determines where these elements should be placed so they can provide maximum benefit to the local environment. The central concept of permaculture is maximizing useful connections between components and synergy of the final design. The focus of permaculture, therefore, is not on each separate element, but rather on the relationships created among elements by the way they are placed together; the whole becoming greater than the sum of its parts

Permaculture is an ethically based solutions oriented system that encompasses ecologically sound technologies into a design pattern with emphasis on connections between a diversity of elements, which when implemented will lead to the regeneration and permanence of the culture.

Primary goal of Component Activities:

The activities will 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.

Commercially Viable Demonstration Sites (2 Pilot Projects).

Pilot projects that demonstrate what Permaculture practices and ecological farming can do on the ground and between average farmers. Farmers seeing a Pilot Project between them, on an average size piece of land, in an average farming area, developing in an average speed rate will have a great impact on their approval and adoption of Permaculture as a system.

A project like this will start showing results within the first year. A documented study that engages surrounding commercial farmers' Inputs and outputs and compares it with this Pilot Project's Inputs and Outputs over a period of 4 years will result in a very nicely documented evidence for the success of this project. Success stories in Jordan similar to this Pilot Project are documented in the link below that shows how a Permaculture Design of an Organic Farm in Wadi Rum, Jordan, improved yield quantity and quality while building soil and feeding the water table.

Figure (1.6 A): Permaculture Design of an Organic Farm in Wadi Rum

Project Site Selection:

Mediterranean climates typically have two slow down periods a year — the cold of mid-winter, and the hot dry of mid-summer. Winter brings bare deciduous trees and brown above and green herbs below, and summer brings green leaf tree canopy above and brown, dried-off herbs below. Only in springtime are both top and bottom green and both lush.
A good permaculture designer can take advantage of the two slow downs in the year and sees them as two edges in time. As we know, the more edges we can take advantage of the better we can design.

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.

Subtropics usually get Summer rain, but the Dead Sea Valley gets the Mediterranean rainfall pattern of winter rain instead, but because it is in an orographic rain shadow it only gets an average of 150mm a year. Consequently 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.

Main activities of the Permaculture project:

Suggested Permaculture Component Project Activities:

1- Training:

Re-educating communities at the ground level is the first step to ensure the success Of the projects. To reach that ultimate goal we need to create a web of local trainers who will transfer this knowledge to their associates, families and communities. All of these training courses can be conducted in our demonstration site in the Village of Jawasreh South Shouna.

Suggested training topics will include the following:

1- The Need to Act, Why farmers need to do the shift to Permaculture?
2- Principles and Implementation of Permaculture design.
3- Soil Management and Erosion Control.
4- Soil Rehabilitation through Partnering with Biology.
5- Seed Saving and Organic Gardening.
6- Recycling and Waste Management.
7- Water Harvesting and Management/Earth Works.
8- Dry lands Strategies and Draught Proofing.
9- Livestock Management.
10- Food Forests/Oasis Agriculture.
11- Renewable & Energy Efficient Technologies.
12- Urban Food Production.
13- Food Processing and Quality Control.
14- Holistic Management and Keyline Design.
15- Re-Education of Consumers, WHY BUY PERMACULTURE.
16- Ecological Farm Management.
17- Permaculture Design Certificate Courses, (PDC). (72 Hour Curriculum).

2- Design and implementation of 2 polyculture pilot farms will include:

1- Main Stable Crops
2- Production is now also increasing, we will also try to encourage farmers
3- To grow a diversity of productive trees in their understory, and an overstory of date palms provides the greatly needed shade that allows other species to survive and thrive in their canopy shade.
4- Tree crops that can be grown commercially and are commonly found in local village gardens include dates, olive, figs, pomegranate, mulberry, guava, carob, banana, papaya, cactus fruits, henna, and grapes. Less common are custard apple, mango, caramel sapote, brazil cherry, moringa, passion fruit,
5- Desert Food Forest Systems on Contour.
6- Vegetables on contour between mixed food forests tree systems.
5- Animal Production starting with small animals and poultry and developing into bigger grazing animals as the system evolves and biomass and feed becomes abundant.
6- Beekeeping.
7- Farm Forestry, Wind Break design and Edible Fences.

3 Set up a Farmer Revolving fund. With $96,048 as seed funds from the project towards a fund for Operation and maintenance costs of the cold storage/packaging and grading facilities.

Timeline of Activities

Project (1.6) Activities Permaculture	Duration (Months)																
	2015				2016				2017				2018				2019
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Jan
1) Training on Permaculture BMPs for 5 days per training section(One training per quarter)																	
2) Training leading to award of Permaculture Design Certificate (17) "2 weeks"																	
3) Establish 2 permacultre Pilots one in the upper middle Vallay and one in Mazrrah/Haditha Valley																	
4) Transformation of regular farms into a Permaculture System																	
5) Set up Four Regional Farmers/WUAs Revolving Fund																	

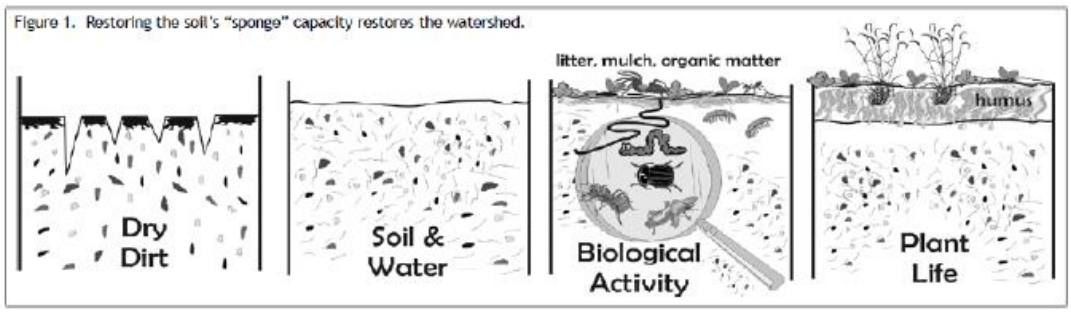
Figure (1.6-B): An imagined Desert Food Forest/Oasis on Swale System

Shade-Water-Soil, (**SWS**) strategy, is the strategy that we need to work Around in Dry Land scenarios that has a degraded land component. Soil in such pilo project needs to be rebuilt from scratch, to show farmers that they can also get their soils back to how they remember it was in their childhood. Water is the Most critical factor in such a project and access to it along with the best utilization are challenges we will need to show that farmers can deal with as well. Shade and the Creation of it will be a priority and phase1 establishment step. Fast growing high trees (productive and support species) are the first things to go in.

Creating large wicking beds through the use of buried, gravity fed drip irrigation system. (see http://www.netafim.com/). Mulch material will need to be supplied & distributed over these areas in the beginning. Over time, the biomass accumulated through re- vegetation of the site will eventually be the source of all the organic matter required. Livestock and their manure are essential for boosting fertility & organic matter content. Livestock may also be strategically utilized and managed along with partnering grazers. Chippers/shredders should be made available to "process" the organic matter we want to use on site. This would be an enormous help. The planting of palm trees & fruit trees among the legumes is the primary focus concerning the establishment of a tree-based cropping system within the proposed production system. With this orchestrated progression/succession, an effective tree canopy & windbreak can be established relatively quickly minimizing excessive evaporation and desiccation caused by the sun and wind, setting the stage for other food crops (perennial & annual varieties) to be grown. Additionally, more livestock can be introduced to the system with the improved management of water. If this arrangement is implemented over a large enough area, a more favorable

microclimate will be generated within the region, helping to restore the proper functioning of the hydrological cycle.

arget



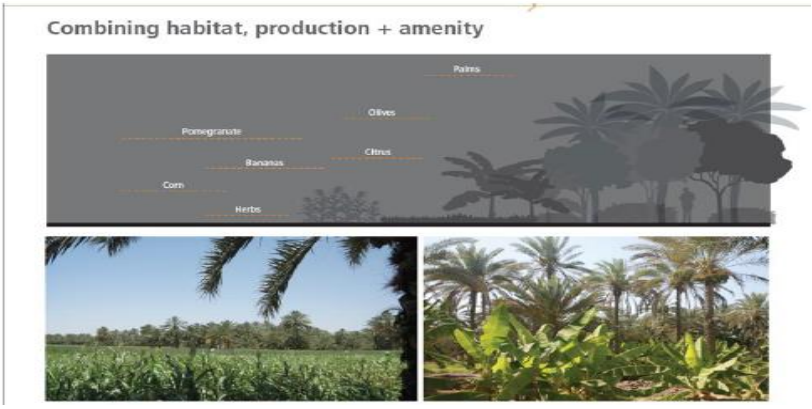


Figure (1.6-C): Desert Food Forests and Intercropping between Palm Over Story Canopy is a Common Oasis Technique.

These pilot projects, although their main concentration is on profit making, can become a training facility and can be replicated in the valley heading north and south to serve and show farmers what can be achieved at their doorstep. This can be run through associations and the model can be extended and replicated throughout the valley.

Expected Results and Indicators

Outcome/Output			
Outcome1: Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level **Output 1**: Targeted population groups participating in adaptation and risk reduction awareness activities.	**Number of beneficiaries**	**0**	**380 farmers**
Outcome 2: Increased adaptive capacity within relevant development and natural resource sectors **Output 2.1:** Number of farms Converted to Permaculture system **Output 2.2:** - Amount of Vegetable produced in (Kg / Year)	**Natural Assets Protected or Rehabilitated**	**0**	**48 Farm**
	Increase in Income	**0 attributed to permaculture as it is not practiced**	**$5000 per farm per year due to enhanced farming practices & savings**

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, Community Based Organizations (CBOs) 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:

- **National Capacity Building Needs for Climate Change Adaptation of Jordan's Agriculture Sector "**

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. 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.

Project (2.1) Strengthening the Capacities of Poor & Remote Communities to Better Adapt to Climate Change Adverse Impacts (At the Four Geographical Zones of the Jordan Valley and Wadi Mousa).

Project Description

The project will focus on:

- Strengthening the capacities of remote and poor communities working in agriculture to be able to adapt to the adverse impacts of climate change through helping WUAs and farmers make better informed decisions.
- Teaching the local community, famers and WUAs about climate change-driven hazards affecting their areas.
- Awareness campaign consisting of a number of learning seminars will be carried out targeting the farmers and WUAs in the north, middle and Karamah and South JV.
- The seminars curricula will focus on: providing explanation of the climate change science, climate change projected impacts, explanation of vulnerabilities and adaptation methods as well as the communities' adaptive capacity.
- The campaign will be done with the direct involvement of 30-40 WUAs and community CBOs, stakeholders and decision makers from governmental entities such MOA, NCARE and Universities.

Main Activities:

- Learning seminars: 6 introductory seminars for the CBOs explaining the science of

Project Expected Results Outcome/Output	Indicators	Baseline	Target
Outcome1: Strengthened awareness and ownership of adaptation and climate risk reduction processes at	**Number of beneficiaries**	**[0]**	**48 WUAs (12 per year) + 2 CBOs per JV**

climate change and main adverse impacts as well as adaptation measures.

- The four gerographical regions of Jordan Valley and Wadi Mousa ww reuse project

- Workshops for farmers will then be delivered by the CBOs giving them tools to better adapt to climate change adverse impacts on agriculture activities:
- ww reuse and adaptation to climate change measures: Promote several adaptive agriculture practices that will help farmers maximize their production.
- Creating a data base for farmers and agriculture CBOs to be used by the SMS system.
  - The SMS system will enable the farmers to send SMS (via mobile customized interface) and specify the parameters they wish to inquire about (e.g crop type, land area, climate conditions…etc) and a message or notice using the application will be sent back with the needed answer according to standard studies of needed amounts of water, best practices and specific warnings.
  - Sending informative messages related to climate change and adaptation.

- **Strategic Results Framework**

local level **Output 1**: Targeted population groups participating in adaptation and risk reduction awareness activities.			**region per year**
Outcome 2: Increased adaptive capacity within relevant development and natural resource sectors - **Output 2.1:** Number of registered farmers in the Jordan valley will be registered users in the SMS System Database	**Number of beneficiaries**	**[0]**	**48 WUAs noting that # of WUAs memberships vary but will cover all members.**

Outcomes and indicators:

- Better Informed society & highly aware communities with ability to adapt to climate change impacts.
- Percentage (80%) of targeted population aware of predicted adverse impacts of climate change.
- At Least 40 -50 % of the registered farmers in the Jordan valley will be registered users in the SMS System Database.

Timeline of Activities

Project (2.1) Activities Strengthening the capacitie sof poor and remote communities to better adapt to CC adverse impacts	Duration (Months)																
	2015				2016				2017				2018				2019
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Jan
1) 6 introductory seminars for the CBOs explaining the science of climate change and main adverse impacts as well as adaptation measures.																	
2 - workshops for farmers will then be delivered by the CBOs giving them tools to better adapt to climate change adverse impacts on agriculture activities																	
3-Creating a data base for farmers and agriculture CBOs to be used by the SMS system.																	

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.

By definition, communication is a participatory, two way process, enabling the inclusion of all people in a critical dialogue to identify solutions and foster change. More concretely, interactive media is a key communication channel and strategic partner for climate change mitigation and adaptation.

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-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.

ICTs are interlinked with climate change in a number of ways. They are most obviously used for a range of technical interventions, from high-level satellite weather mapping to scientific research, data analysis and projections and vulnerability assessments.

General Objectives of the project:

- Informing and raising awareness on the effects of climate change.
- When it comes to adaptation, the emphasis in using ICTs is mainly on reducing risk and vulnerability while increasing coping strategies at the local level.
- Reaching remote villages through dissemination, hence enhancing the effectiveness of early-warning systems for disaster prevention and risk reduction and therefore saving lives
- ICTs can also empower the poor and marginalized to raise their voice for political accountability, advocacy and meaningful action.

Specific Objectives:

- Identifying, building, documenting and sharing locally rooted and contextualised adaptation strategies and solutions among communities.
- Facilitating local risk assessments and making communities part of the process to mobilize local knowledge and develop local coping mechanisms.
- Demystify climate change and improve climate literacy at all levels of society
- Internalize climate change with local people by penetrating local pockets of knowledge through local newspapers, community radios and village knowledge centers in order to identify specific coping requirements as a basis for sound policy making.

CREATING AN EARLY WARNING SYSTEM FOR DROUGHT FOR FARMERS IN THE KINGDOM (at the Four Geographical Zones of the Jordan Valley and Wadi Mousa).

Project Description

- Create an early warning system for people working in the field of agriculture - Mainly Jordan valley the system will consists of:
  - A web Portal for information of climate change.
  - A mobile application.

- A two way SMS Service.
- An Irrigation Management Information System (IMIS)

- The system aims at providing scientifically based climate, water quality and quantity, and Crop Risk information for decision makers in order to make informed decisions that will minimize the losses risks caused by projected decrease in water.

- Providing a two way SMS service for farmers that aims at giving support to farmers on the best practices that should be implemented to maximize production within the limited available resources.

- Develop a package of Irrigation Management Information System (IMIS) which can provide irrigation personnel (farmers) with real time estimates of irrigation requirements and scheduling. The specific objectives of this project is as follows:

  - Establish an IMIS based on real time meteorological data, soil characteristics, water quality, crop type, and current irrigation system efficiency.
  - Develop infrastructure and information management tools for rapid and accurate dissemination of irrigation scheduling information.
  - Adopt state-of-the-art models for predicting crop irrigation requirements.
  - Establish irrigation scheduling criteria for major crops in the Jordan.
  - Establish data network that can easily be used by other relevant national institutions through improved classification data entry and retrieval, and communications.

➢ Main Activities:

- Develop a web Portal for the management of all related information to climate change this web portal will have three main user types, a normal guest, a registered user and an administrator user, each one of the users will have a certain privilege and will be granted access to the roles in the application as per his job.

- Develop a mobile application for early warning system to reflect information of the web portal. The mobile application will enable the user (any of the three types) access the Databank of information using its interface, in addition to a way to enquiry about irrigation times, types and amounts, latest news, climate change actions and behaviors, …etc.

- Implement a two way SMS Service for early warning system, which will enable the farmer to send an enquiry SMS containing certain facts about the area of enquiry and accordingly the SMS system will find the suitable answer to it as per the standard studies and information and reply back to him with the answer.

- Develop an Irrigation Management Information System (IMIS) which serves as climate change early warning System. The main objective of this project is to create an automated system that collects data from the data acquisition weather stations, sends it to the servers, then imports that data into a database making it available for analysis. This system provides an online functionality to find up-to-data source of information related to the data collected for all concerned stakeholders. The system also provides up-to-date statistical information to researchers and decision makers. A similar system has been developed and implemented by RSS and applied at the National Centre for Agriculture Researches and Extension (NCARE). The project will help initiate and sustain a technology transfer program concerning the issues of when to irrigate and how much irrigation water on-farm level to maximize water use efficiency.

Project Expected Results **Outcome/Output**	**Indicators**	**Baseline**	**Target**
Outcome1: Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	**Number of beneficiaries**	**PDTRA, MOA and JVA/**	**MOEnv, MOA, MWI, PDTRA and JVA**
Output 1: Targeted population groups covered by adequate risk reduction systems	**Early Warning Systems installed**	**[0]**	**3 operational systems**
Outcome 2: Increased adaptive capacity within relevant development and natural resource sectors - **Output 2.1:** Number of registered farmers in the Jordan valley will be registered users in the System Database	**Number of beneficiaries**	**[16 WUAs in JV and 26 farmers Wadi Mousa Sad Ahmar WUA NGO]**	**[30 WUAs in JV and 40 farmers Wadi Mousa Sad Ahmar NGO]**

Outcome 3: Increased ecosystem resilience in response to climate change and variability-induced stress **Output 3.1:** Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	**Assets produced, Developed, Improved or strengthened**	**[0]**	**2 (Wadi Mousa and JV**

➢ Outcomes and indicators

- Decision makers working in the field of agriculture have better knowledge of predicted adverse impacts of climate change.
- At Least 40-50 % of the registered farmers in the Jordan valley will be registered users in the System Database.
- Having a better informed agriculture society that is highly aware with strengthened ability to adapt to climate change negative impacts.
- Conduct various scientific awareness sessions regarding the fair and effective usage of the two way SMS Service.
- Conduct ICT awareness sessions regarding the fair and effective usage of the two way SMS Service.
- Collaborate the website and mobile system to send awareness and informative information.
- Send one way SMS to participants with controlled informative content.

Project (2.2) Activities Creating An Early Warning Syestem for farmers in JV and Wadi Mousa	Duration (Months)																
	2015				2016				2017				2018				2019
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Jan
1- Develop a web Portal for the management of all related information to climate change																	
2- Develop a mobile application for early warning system to reflect information of the web portal.																	
3- Implement a two way SMS Service for early warning system																	
4- Develop an Irrigation Management Information System (IMIS) which serves as climate change early warning System.																	

Project 2.3 Jordan Valley Water Sustainability and Agribusiness Competitiveness

Background:

Client needs and demand

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.

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.

Developing a competitive, inclusive and sustainable agribusiness industry is therefore a priority of the government. Greater private-sector investments are expected to contribute to improving the rural incomes and sustainable development of agriculture in the long term. 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.

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 component 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.

Basic approach and rationale

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.

Description of Key Project Components and Phases

The financing requested by this proposal is sought to provide technical assistance to support the following process steps/components (also summarized in the chart below):

- Support for the multi-stakeholder process,
- Identification of related priority recommendations,
- Establishment consensual policy reform proposals,
- Support to ongoing implementation,
- Monitoring reform implementation

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:

Project Themes

- Industry-specific regulations
- Agricultural skills, technology and innovation, cropping patterns
- Marketing and export, access to markets
- Access to finance, Agriculture Credits

- Integrated water operation, crop management(grading , packing and cold storage) and management (O&M) infrastructure

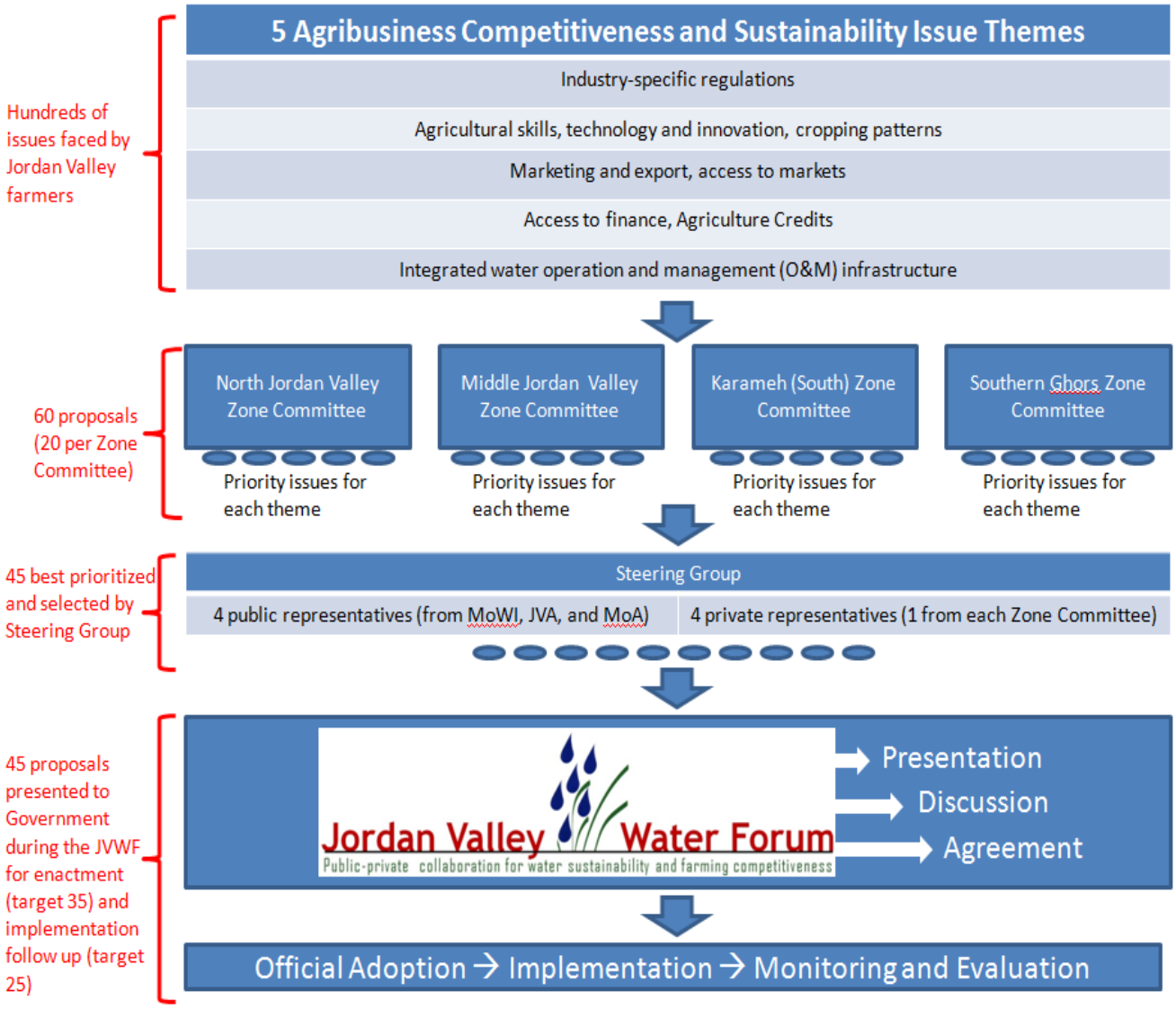


Figure (2.3.1): Jordan Valley Water Forum Structure

Phase I: Securing buy-in, setting up a Multi-Stakeholder Engagement Process (Completed January 2012-January 2013)

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 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.

Project 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 Agriculture Credit Corporation (ACC) or MoA support.
10. Implement protection measures along the King Abdullah Canal at JV 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.
13. A 2nd JVWF took place in January 2013 where initial results were announced (the first three points above).

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

Phase II: Establishment Consensual Policy Reform Proposals
(November 2014 - August 2015)

- **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 (September 2015- October 2016)

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.

Farmers also need some infrastructure support that would result in enhanced access to markets through the provision of regional cold storage, grading and packaging facilities for vegetables produced in the region:

A cold storage facility per region serving the farmers of the WUAs will be part of the activities: This will ensure that they will have ***food security over climate change impacts and regional fluctuations*** in the marketing system as Jordan is severely impacted by the wars and unrest of the neighboring countries. It consists of ten units, with a concrete base & covered by a Hunger as a roof, the average size of a single cooling unit in the facility is (4*8*3) m, each unit has its own control board, and there will be a central control unit. The estimated Total cost of each facility is around **$169,491.5**. Additionally there will be a sorting, grading , filling & packaging unit that will cost around **56,497.17 $**. The total cost for both facilities is **$225,988.67 per region. As planned there will be four of this facility which will be placed in an agreed upon locations in North, Middle & Karamah and Fifa/Mazraah/Haditha/Ghour) of the Jordan Valley (JVA). The total cost of these is ($225,988.67 * 4) = $903,952.**

Table (2.3-A): Project Outputs/Outcomes & Indicators

PHASE I		
Outputs	**Outcomes**	**Development Impact Indicators**
• **Number of Collaborative Governance Industry Assessment Reports completed** [BASELINE=0] [TARGET=2] • **Number of entities receiving advisory or knowledge services** [BASELINE=0] [TARGET=27] ▪ **Number of workshops, training events, seminars, conferences, etc.** [BASELINE=0] [TARGET=3]	• **Number of Collaborative Governance Industry Assessment Reports findings endorsed by key stakeholders [BASELINE=0] [TARGET=2]** • **Formal partnerships or coalitions created/expanded [BASELINE=0] [TARGET=1]**	**N/A**
PHASE II		
▪ **Number of workshops, training events, seminars, conferences, Number of actions or reforms proposed by the MSEP that were Development Impact Indicators** **etc.** [BASELINE=0] [TARGET=3] • **Number of Working Group Meetings [BASELINE=0] [TARGET=6]** • **Number of Platform-issued reports, assessments, surveys, guidebooks, brochures, etc. [BASELINE=0] [TARGET=4]** • **Reform agenda drafted (Number of actions or reforms proposed by the Platform) [BASELINE=0] [TARGET=45]** • **Number of actions or reforms proposed for prioritization /selection**	**enacted or acted upon** [BASELINE] [TARGET=35]	▪ **CDRF Intermediate Capacity Indicators:** **(i) Enhanced knowledge/skills** **(ii) Strengthened coalitions** **(iii) improved consensus** (iv) new implementation know-how

PHASE I		
Outputs	**Outcomes**	**Development Impact Indicators**
/modification /feedback through mobile outreach campaign [BASELINE=0] [TARGET=10]		
PHASE III		
Outputs ▪ **Number of workshops, training events, seminars, conferences, Outcomes** **etc.** **[BASELINE=0] [TARGET=4]** • **Number of Working Group Meetings** **[BASELINE=0] [TARGET=6]** **Number of Platform-issued** **reports, assessments, surveys, guidebooks, brochures, etc.** **[BASELINE=0] [TARGET=4]**	**Number of actions or reforms proposed by the MSEP that were Development Impact Indicators** **effectively implemented** **[BASELINE] [TARGET=25]** • **$-volume of additional donor support to reform programs (US Mil)** **[BASELINE=55] [TARGET=75]** **(current=** **USAID-ISSP 18M** **USAID- Waste water treatment** **10M** **USAID-Filtration 3M** **GIZ-WUAS 3M** **EU-Water Agribusiness Urban and Health-17M** **UNDP-Climate Change Adaptation 4M** **Total=55M)** **(Target represents a 35% increase in donor funding for Agribusiness and water in Jordan, which would include new World bank Group TA/Lending operation)** • **Number of new World Bank Group advisory or lending operation streaming from the result of this work** **[BASELINE=0]** **[TARGET=3]**	**JOBS AND FIRMS** • **Number of farmers in Jordan valley** **[BASELINE = 6000]** **[TARGET=6000]** • **Average number of employee per farm** **[BASELINE = 3] [TARGET=4]** • **Number of direct jobs in Agribusiness sector in Jordan Valley** **[BASELINE = 24,000]** **[TARGET = 30,000]** **Number of indirect jobs related** **to Agribusiness sector in Jordan Valley** **[BASELINE = 48,000]** **[TARGET=60,000]** • **Number of new micro-enterprises created linked to the agribusiness industries** **[BASELINE = 0] [TARGET=300]** • **Number of new direct and indirect jobs related to Agribusiness sector in the Jordan Valley** **[BASELINE = 0]** **[TARGET=18,000]** **WATER AVAILABLE FOR AGRIBUSINESS** • **Number of Million Cubic Meter (MCM) of bulk water available per year for all Jordan** **[BASELINE = 500] [TARGET = 500]**

PHASE I		
Outputs	**Outcomes**	**Development Impact Indicators**
		• **Number of Million Cubic Meter (MCM) of bulk water available per year for Jordan Valley irrigation [BASELINE = 160] [TARGET = 160]** • **Number of Million Cubic Meter (MCM) of bulk water lost per year to Jordan Valley irrigation due to illegal connections [BASELINE = 8] [TARGET = 2] [This is 5% and 2.5% respectively]** • **Number of Million Cubic Meter (MCM) of bulk water lost per year to Jordan Valley irrigation due to bad infrastructure and evaporation [BASELINE = 16] [TARGET = 8] [This is 10% and 5% respectively]** **Number of Million Cubic Meter (MCM) of water available to Jordan Valley irrigation at the farm level [BASELINE = 136] [TARGET = 150]** • **Number of Million Cubic Meter (MCM) of retail water lost per year to Jordan Valley irrigation due to issues at the farm level [BASELINE = 61.2] [TARGET = 22.5] [This is 45% of 136MCM and 15% of 150 MCM respectively]** • **Number of Million Cubic Meter (MCM) of retail water effectively used for Jordan Valley irrigation at the farm level and available for Agribusiness sector [BASELINE = 74.8] [TARGET = 128]** • **Number of additional Million Cubic Meter (MCM) of retail water effectively used for**

PHASE I		
Outputs	**Outcomes**	**Development Impact Indicators**
		Jordan Valley irrigation at the farm level and available for Agribusiness sector [BASELINE = 0] [TARGET = 53.2] **MARKET-BASED IRRIGATION** • **Number of water user association that become commercial water utilities [BASELINE = 0] [TARGET = 23]** **[This is actually 4 water commercial utilities regrouping the 23 WUAs in 4 regional utilities]** **EXPORTS AND INVESTMENT** **[Note: these numbers have not yet been calculated at this time as some key reliable data is still missing]** • **Agribusiness exports per year [BASELINE =] [TARGET =]** ▪ **Increased revenues for in Agribusiness sector thanks to new crops and better managed resources [BASELINE =] [TARGET =]** • **Increased in FDI in Agribusiness sector [BASELINE =] [TARGET =]** • **Private Sector savings in Agribusiness sector resulting from reforms advocated by Forum [BASELINE =] [TARGET =]**

Strategic Alignment

The proposed project is aligned with other ongoing WBG competitiveness and innovation focused initiatives in Jordan; Innovation Strategy, partnership for Competitiveness TA, Education for Employment (E4E), and SME finance diagnostics and lending.

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.

CIIP Global Program – Expected Results after the four Years

Outputs	Outcomes	Development Impact Indicators
M&E Core Impact Indicators		
• **70 projects,** including 10-15 large-scale, multi-sector projects • **At least 100 reports** (industry analytics, innovation assessments, surveys, manuals, strategic option reports, just-in-time policy notes, economic and sector work) completed • **At least 100 workshops**, training events, seminars, conferences to facilitate collaboration and coordination between public and private sector stakeholders – with 5000+ participants **20 high-level South-South and North-South knowledge exchange events** to create opportunities for policy makers and practitioners to exchange views and experiences on innovation and competitiveness programs – with 150+ public officials and private sector representatives involved • **Major knowledge investments** in Knowledge Base, Global platforms for implementers and field research	▪ 70 active projects including 10-15 large-scale, multi-sector projects from design to adoption of recommended competitiveness and innovation reforms. Including; • **10-15 effective public-private coordination mechanisms created** • **10-15 project implementation units established/strengthened** to support adoption of reforms and policies **At least 40 development and support strategies** adopted (e.g., industry development strategies, industry R&D strategies and innovation support programs, etc.) Support and establishment of **10-15 SME and innovation funding instruments** (e.g., innovation funds with matching grants, early-stage funding, etc.) • **Support provided to at least 25 "clusters"** and nascent industry hubs through network development and development of forward- and backward- linkages. • Major Knowledge initiatives used by CIIP practitioners*	▪ **US$6-8 billion** in lending and public sector investment through the WBG and other development partners in support of CIIP reform programs ▪ **US$100-150 billion** leveraged in direct and indirect private sector investments ▪ **100,000+ direct beneficiaries**(of which at least 20% female) e.g. entrepreneurs and new entrants, business owners and employees, recipients of training and skills upgrading and previously excluded groups ▪ **5000+ firms supported** through ▪ provision of financial and non-financial services (including new enterprises) ▪ Key results measures in selected industries supported by large-scale reform operations: - **% growth in export** - **% growth in firm size** (revenue or investment) - **% job growth** in supported industries and supply chains

An overview matrix on direct activities that are to be implemented

PILOT AREA	**Activity**	**Activity**	**Activity**
AREA BOUNDARIES	DA1-DA 10	DA11-DA21	DA22-DA28
TYPE OF CULTIVATION	Citrus	Citrus and Vegetables	Vegeatbles and Date Palms
WATER RESOURCE	Fresh (Yarmuk River Water)	Mixed (KTR and Yarmouk waters)	KTR and Brackish waters
CURRENT FARMERS CONCERNS	Water Shortage	1-Physical water quality	1- Water shortage
		2- Salinity	2- Physical quality
		3- Water shortage	3- To a lesser extent salinity
FUTURE CONCERNS	Salinity	Same as current problems	Same as current problems
PROPOSED NEEDS TO BE COVERED BY CIIP established REVOLVING FUNDS	Change from surface to efficient drip irrigation system	On-farm Filtration Systems	
	Optimization of drip irrigation system	Demo sites on the impacts of blending KTR and Fresh Water on yield	
ANTICIPATED RESULTS	**Adapted irrigation systems to anticipated reclaimed water use**	**Reduced claims of farmers related to physical problems of water quality**	
NEEDS TO BE COVERED BY TECHNICAL SERVICIES	Awareness and training campaign on raising on-farm irrigation and fertilization efficiencies and occupational health problems		
ANTICIPATED RESULTS	**Raised awareness of farmers on the nutrients available in reclaimed water and its impacts in reducing cost of fertilization**		
	Raised on-farm irrigation efficiency and reduce costs of fertilization		
	Reduced risks of microbiological contaminants		
	Raised awareness of farmers on hygiene practices		
	(a) ***Ensuring the sustainability*** for any intervention by having a proper management and operation arrangements of the pilot. WUA in that area should manage this pilot where capacities for (O&M) of the operators/stakeholders addressed to ensure safe and successful operation of the wastewater treatment system(s). (b) ***Capacity building***, *TA and training* that include also farmers' awareness and training. (c) ***Crop and water quality monitoring***, *removal of export and acceptance barriers for produce irrigated with reclaimed water should be*		

	addressed coupled with enhanced guidelines and famer/consumer understanding that are based on the WHO 2006 guidelines on reuse. **(d) *Piloting Wastewater safety plans and health labeling with linkages to Climate Change adaptation.*** (e) ***M&E of the wastewater quality*** *should be enforced and institutionalized.* **(f) *The provision for JFDA ISO 17025 accreditation*** *should be supported in order to overcome export barriers and ensure proper crop certification programming*

***RESULTS PROJECTION –KNOWLEDGE**

- **Knowledge base**
  - Consolidated datasets in widespread use among teams and development partners, significantly quickening and raising the quality of project design and impact measurement. (e.g. expansion of enterprise survey database relating to sectoral innovation).
  - In-depth case studies actively used by policymakers and development practitioners.

- **Global platforms for implementers**
  - Online collaboration platform ("CII Link") in widespread use among practitioners.
  - Expert practitioners
  - Annual meetings to review progress of initiatives undertaken, challenges faced, learning to date, discussion of ways to incorporate the learning, and identification of priorities.

- **Field research**
  - Collect best practices in terms of operations and policies, and analyze successful innovation interventions from different stakeholders for dissemination.
  - Flagship research as part of the Knowledge Initiative could include: a toolkit on innovation indicators, development of an integrated innovation web knowledge platform

Project Timeline:

Project (2.3) Activities	Duration (Months)																
	2015				2016				2017				2018				2019
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Jan
Phase I																	
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 for the JVWF 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.																	
Phase 2																	
1- Sustaining the participatory process																	
2- Feasibility studies for reform proposals resulting from JVWF																	
3- Establishing consensus around policy reform proposals (selection criteria)																	
Phase 3																	
Support to reform implementation and monitoring implementation support																	
Support implementation (program management):																	
Establish monitoring systems and feedback loops (M&E, Impact Evaluation)																	
- Monitor progress against action plans																	
Provide technical inputs across the reform program																	
Implement workshops to build understanding of the issues and promotion of reforms.																	

General economic, social and environmental benefits of project/programme

B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.

All selected locations were selected based on national surveys and assessments of poverty pockets in Jordan as described in the" PROJECT / PROGRAMME BACKGROUND AND CONTEXT" Section.

Key benefits of the proposed project components and activities

Economic benefits of the project can be broadly categorized into two types: reductions in

potential losses of agricultural produce or assets (e.g. livestock or built structure) imposed by additional climate risks; and enhanced/diversified income opportunities especially for the landless and impoverished farmers. Farmers and WUAs will benefit from diversified livestock assets, homestead gardens to expand micro-scale agro practices, improved ecosystem services (such as greater availability of non-forest products and more reliable freshwater supply), as well as through greater opportunities for manual labour in water-, and agro-related components of the project. An important element of the proposed project is to strengthen the participation and stakes of beduin and WUAs in Community-based Organizations. At the same time, the project will also expand income earning opportunities specifically targeting the landless which directly and indirectly contribute to building their resilience. This will be achieved through access to diversified livestock production system. After project economic benefits include:

1. Improved agricultural practices with diversified cropping patterns and species
2. Supplemental income earning opportunities through on farm labour:
3. Access to diversified livestock practices through sheep production related activities
4. Enhanced homestead gardening production
5. Reduced post-harvest losses through improved practices and access to machinery

Expected social benefits from the project are multiple and interrelated with economic and environmental benefits that will be brought about by the project. Most importantly, a dedicated Component focusing on increasing freshwater availability through wastewater reuse reliving the fresh water supplies for municipal and tourism use, while rainwater harvesting and surface water capture measures per village supported by ecosystem-based measures contributing to the increase of sub-surface rainwater capture. The combination of measures proposed under the various outcomes will impact the entire population in the project target areas . It is also important to note that natural disasters not only destroy economic assets but also impact social cohesions as the lack of economic viability accelerates outgoing migration trends in search for income earning opportunities. Climate risk information dissemination network as well as heightened awareness that will be strengthened with the AF resources will also increase the preparedness of vulnerable communities.

After project benefits on the social level include :

1. Social cohesion and community cooperation through climate-sensitive water resource management ;
2. Reduction of water-borne diseases resulting from climate change reduced per capita and health benefits through improved access to a higher per capita of fresh water sources and.
3. Increased risk awareness and improved knowledge on climate change impacts enhances capabilities of communities to implement adaptation measures
4. Diversified cropping patterns and livestock production increase communities resilience and coping abilities after disaster events.
5. Improved food safety and security, providing additional household income from Cash for Work schemes.
6. Heightened awareness and capacity for disseminating and interpreting early warning information to mitigate the risks of CC hazards

7. Abated economic and human losses from increasing and intensifying incidents of climate-induced disasters.

It is important to note that the JV farmers are already highly vulnerable to the current climate variability, let alone the future climate variability which are predicted to be larger. For example, per capita water consumption in the Dry Zone is currently less than 50% of the WHO-suggested standard due to unavailability of freshwater resources.

1. Water conservation and reforestation will improve soil fertility, retain moisture, and restore ecosystem resilience and protective ecosystem services
2. Carbon sequestration will be increased through reforestation, watershed area conservation, and the enhanced agro systems management
3. Dependency of communities and livestock on fragile and remnant natural resources for fuel wood, construction and fodder will be reduced through wastewater reuse for irrigation of fodder .
4. Diversification of cropping patterns, re-introduction of natural species and medicinal plants for cosmetic use, income generation, and community-based adaptation measures

Component (1) Projects (1.1-1.5):

Recycled (reclaimed) water projects have many benefits:

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. In addition to solving water problem the project will also produce forages for livestock which will aid in 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 vallies (wadis) 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 and Jordan valley by becoming adapted to reclaimed water reuse in irrigated agriculture , sheep herders on fodder crops irrigated with treated wastewater as a

supplement to rainwater,

Sheep production activities 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

Aggressive beekeeping proposed for Wadi Mousa through training selected farmers leaders to become experts on beekeeping production and to disseminate their knowledge to the rest of the community. 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

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 with treated wastewater 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 Valley. 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.

Aloe Vera cultivation and irrigation with reclaimed water will have an excellent potential for generating a new cosmetic market nieche and thus boost the socio economic viability of the locals and females as it will create jobs for the females in Wadi Mousa.

Benefits of Aloe Vera and its uses:

Aloe Vera has also a magical impact on health and beauty of hair. It has a magical impact on a woman's hair beauty and their skin freshness. Aloe Vera exists in making cosmetics because of its benefits. Recently we got used to see the name of Aloe Vera on shampoos, soaps and creams that moisturizes skin as well as anti-aging creams. Many women have a problems of hair loss

significantly, and how to revive and revitalize it. It should be noticed that the effectiveness of Aloe Vera's juice in treating acne and resulting pimples on the skin, and also helps to improve the freshness of the skin, and soothe the irritancy when it is used on the skin directly. Aloe Vera is considered as the miracle plant in the medical plants' world.

Medical Use in ancient medicine:

Aloe Vera was the secret of beauty and serenity of Cleopatra's skin, where she kept on using it daily as a cream for her skin. As well as Napoleon's wife Josephine, she used to add it's succulent in a milk and then massage her face. Ibn al-bitar said "that this plant is useful by eating or drinking it, it's a cure for tumors, warts, pain in the joints, nose and mouth sores and muscles which is in the side of the tongue."Pharaohs used this plant as a juice in order to get rid of pain of Dysmenorrhea pains, intestines, eyes ulcers, and burns.

Modern medicine:

Studies found that Aloe Vera's succulent is a charming raw material in manufacturing cosmetics and skin care products like soaps , shampoos ,conditioners , creams , and body lotions , etc. It's used as a main element in manufacturing cosmetics because it’s rate of skin PH. And other studies indicate that this plant is useful for enhancing body's immune system.

Researchers discovered that the gel made of Aloe Vera is useful for curing the ulcers of the stomach intestines. This research was conducted by a medical team from Queen Mary's School of Medicine in London, England. Where the results showed that Aloe Vera's gel could be a cure to these diseases.

Researchers also found that this plant is an effective anti-pain. Since ancient times, It was used

for treating burns and skin diseases including mange, sunburn and insect bites.
Researchers at Morristown Hospital, Swanzaa, did experiments to prove Aloe Vera's effectiveness in the treatment of Irritable Bowel.

Other Studies in the U.S proved that the extract of cactus is a treatment for burns and wounds, and it helps in reaching blood to wounded and burned areas. In a clinical study that was carried out on diabetics, they found that cactus has impacts on blood sugar levels. Another study proved that it could lower triglycerides and blood sugar by taking a spoon full of fresh Aloe Vera juice twice a day.
A research study at the Faculty of Pharmacy, at King Saud University, as well as in the King Faisal Specialist Hospital about the effects of cactus on blood sugar, this study proved the effectiveness of cactus in lowering blood sugar. A patent was awarded for an American Company, Texas in 1994. This patent proved that one of cactus derivatives can activate the immune system and this will be useful in the treatment of cancer and some anti-viruses such as the AIDS virus and the virus that causes measles.

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.

Potential Beneficiaries of Reclaimed Water Reuse in Wadi Mousa

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 use of fresh water supply for irrigated agriculture then, the potable water supply becomes available to meet other important municipal and touristic 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 Mousa, 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.

There are Indirect beneficiaries of water reuse for irrigation that 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).**

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

The treated effluent in project (1.2) is used to irrigate & produce several agricultural crops (Animal Feed Crops-Fodder), which could be easily sold and utilized by the farmers as animal feed and thus generate good income for the project.

Moreover rainwater harvesting (project 1.5) 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.

Potential positive impacts for project (1.4):

The WWT & R project will generate a number of positive impacts. For a start, it will provide a controlled sink for the collection and treatment of septage in the area; thereby discontinue current practices and associated environmental and health impacts. The project will strengthen institutional ties among the different stakeholders to ensure the project's sustainability and will mobilize local resources during implementation (e.g., project committees, truck drivers, workers, technicians). The project will also provide an additional and reliable source of water for irrigated agriculture, thereby generating financial benefits to farmers while relieving pressure on fresh surface water resources.

During the scoping session in North Shouneh, the participants identified a number of broad as well as specific impacts. Based on the results of the brainstorming session, the proposed WWT&R project in North Shouneh will potentially:

- Reduce expenses borne by households for emptying their cesspits
- End the problem of septage flowing in the streets and help the municipality of Mu'ath bin Jabal maintain a clean environment
- Confine septage to one location thereby protect agricultural lands from pollution
- Provide a new source of irrigation water for agriculture
- Contribute to improving environmental conditions in residential communities
- Organize/streamline the work of tanker trucks
- Provide new jobs for local residents
- Increase the price of land surrounding the WWTP
- Generate revenues to support the municipality
- Protect local communities by averting an environmental disaster in the future
- Provide fertilizers and fertilization at a low cost
- Attract birds around the WWTP
- Protect ground and surface water from pollution
- Limit pollution and contamination of agricultural crops
- Reduce the incidence of disease outbreaks
- Facilitate/encourage the construction of a sewage system in the future
- Encourage replication in other areas of the Kingdom (based on project success)
- Handle/treat all waste products either biologically or physically
- Invigorate the community (based on project success), open communication channels within the community, encourage voluntarism and mo
- Plant forest trees for shade and cooling effects

Potential positive impacts for project (1.6):

Adopting permaculture and agro-ecological techniques for Land use, and extending the

appropriate technologies, E.g. : broad acre and small scale water harvesting techniques, recycling of biomass, dry lands farming strategies, and small scale urban farming and food forestry projects have multiple benefits summarized in the following :

Since it uses a whole system approach, it generates a stable future adapted and profitable investment. It uses biologically fixed nitrogen, i.e avoids the multiple ills of synthetic nitrogen as: destruction of soil organic matter, high energy use, environmental pollution etc. It also help maximize soil Health in particularly organic matter levels;. Minimize the use of external inputs such as fertilizers, fossil fuels, and biocides, also it reducing the exposure to cost increase (of previous inputs) and their negative impact on farm profitability

Food production improvements will start occurring through one or more of four different mechanisms:

1- Intensification of a single component of farm system, with little change to the rest of the farm, such as home garden intensification with vegetables and/or tree crops, vegetables on rice field embankments, and introduction of fish ponds or a dairy cow.

2 Addition of a new productive element to a farm system, such as fish or shrimp
In paddy rice, or agro forestry, which provides a boost to total farm food production and/or income, but which does not necessarily affect cereal productivity
3- Better use of nature to increase total farm production, especially water (by water harvesting and irrigation scheduling) and land (by reclamation of degraded land), leading to additional new dryland crops and/or increased supply of water for irrigated crops, and thus increasing cropping intensity.

4-Improvements in per hectare yields of staples through the introduction of new regenerative elements into farm systems, such as legumes and integrated pest management, and new and locally--appropriate crop varieties and animal breeds.

Benefits of Permaculture /Polyculture productive Landscapes

Site Wide Landscape System Benefits from Productive Landscapes	
Measureable / Direct	**Non measureable / Direct**
Produce at a minimum 2 to 6 times more food than commercial agriculture, with no transport costs.	A productive ecosystem with natural habitat.
67% to 88% less water use required and if rainwater storage is design into the city design the vast majority of this can be capture on site annually from hardware runoff	A natural cooling system for the city.
Build the soil up to 60 times faster than in nature especially when all the organic waste streams of the city are connected to the process	A landscape that is beautiful and engaging.
99% less energy than commercial agriculture, while using a fraction of the resources especially when grown on the site of the city	An absorber of all surplus runoff water from storm events.
Reduce by half or more the amount of land required over modern agricultural monoculture systems.	A place of education and extension of Masdar systems.
50% to 100% less fertilizer required	

Mitigation of Negative Impacts

Infrastructure maintenance on the Berseem (fodder) plot was done for 100 Dunums while the other 50 Dunums is still pending funding because of the poor economic conditions for these farmers where new main filtration unit is needed as well as the need for new irrigation mains and laterals and maintenance/upgrade of the irrigation control units. The Implementation of the proposed project program will assist in solving these problems. Additionally The establishment of a revolving fund will assist farmers in improving, fixing 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.

Also The number of farmers making use of treated effluent (and reducing direct disposal into the environment) are more than before.

Providing technical assistance for improving cropping pattern and introducing drought tolerant species and water conserving crops

Comprehensive field evaluations revealed several problems affecting cropping patterns at the project site. Crop yields can be improved through implementing proper cropping patterns. Improved farming plans will be developed in cooperation between the farmers and the project team, and in consultation with NCARE, MoA and other experts, to maximize the resources available at the site and optimize the use of reclaimed water. The project team will seek the

advice and recommendation of local experts working in similar institutions. The recommendations will include alternative cropping patterns, most proper and efficient irrigation schedules, increased use of native plants and trees suitable for grazing animals, proper pruning, fertilizing, and harvesting practices for fruit trees, and adaptation of crop rotation especially when direct grazing is practiced on the irrigated fields.

Assisting farmers in improving the quality of their products

At the Wadi Mousa pilot project, farmers are generating income from olives, barley, and alfalfa. Alfalfa is the most profitable crop in Wadi Mousa, while olive production covers farmers' household uses. Farmers occasionally encounter difficulties selling their products because of poor handling and lack of experience. Improved alfalfa harvesting and storage strategies can raise product quality and improve marketability.

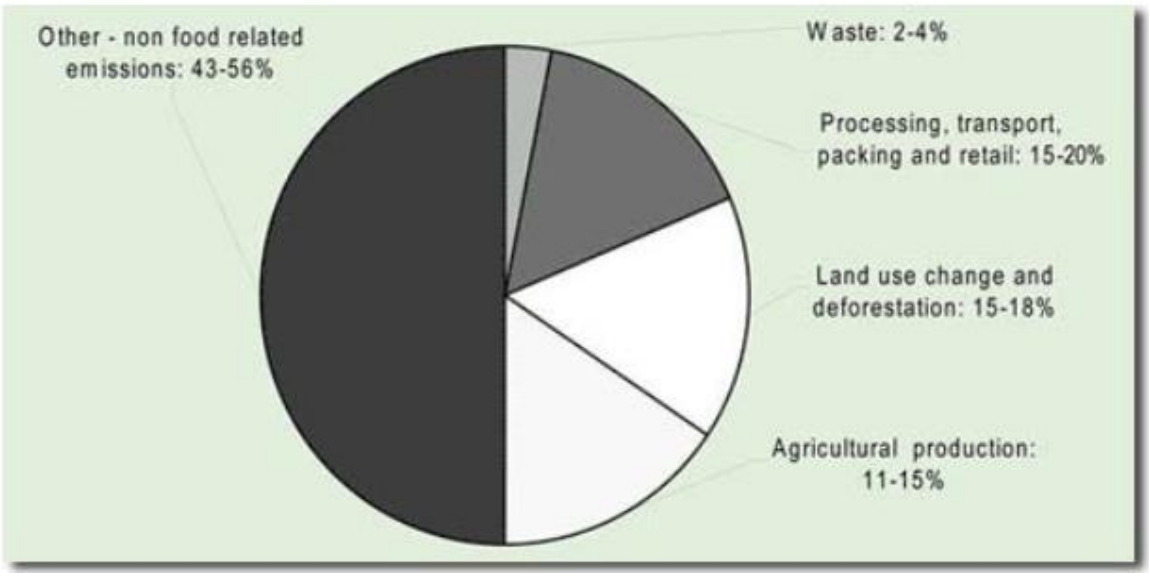
Climate Change Adaptation through the Cultivation of Native Trees along the road to the WWTP

One of the main results of the climate changes on the area at Wadi Musa, is the damage that happen to the natural plants and vegetation as a consequence of the change in rainfall patterns, averages and change of temperatures which has lead to the loss of native plant trees such as Phoenician Juniper, Karop, Dufla ,and Ratum. Based on that an intervention is needed to protect the organic origins of these native species as a minimum intervention and irrigating them with reclaimed water to re-spread their presence. Cultivating along the 2 km of the main road leading to the WWTP with natural trees as Karop, Juniper and Dufla to achieve the landscaping needs and protect the organic origin for these kinds and to participate in the biodiversity protection in the site.

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 germplasm 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.

The proposed wastewater reuse project at Tal Mantah (project 1.2) has Environmental, social & health benefits, additionally it is considered as a very good solution for the disposal of potentially polluting sepatage or polluted wastewater in (Dair Alaa district) by illegally discharged to surface and groundwater which if disposed to the environment may harm the ground water and the surrounding habitat.

Poverty and other social problems are leading to unsustainable agriculture, degradation of natural resources and increased migration. Another major challenge is the impact of globalization, due to the changes in the world trade system and potential.



Agriculture and Food System Contribute 50% of GHG Emissions

Olivier de Schutter, UN Special Rapporteur on the Right to Food is in no doubt that agro--ecology is a solution to the crises of food systems and climate change, he sights studies such as the one shown in the table below that was published in 2006 which shows an increase be 79 per cent in crop productivity on 12.6 million farms that adopted sustainable agriculture (as in the proposed Permaculture project 1.6), These farms crossed 57 developing Countries covering 37million ha.

Below is a summary of impact of adoption agricultural sustainability technologies and practices on 286 projects in 57 countries.

FAO farm system category†	Number of Hectares Adopted by Farmers	Under sustainable agriculture	Average percent increase in crop yields‡
Smallholder irrigated	177,287	357,940	130
Wetland rice	8,711,236	7,007,564	22
Smallholder rainfed humid	1,704,958	1,081,071	102
Smallholder rainfed highland	401,699	725,535	107
Smallholder rainfed dry/ cold	604,804	737,896	99
Dualistic mixed	537,311	26,846,750	77
Coastal artisanal	220,000	160,000	62
Urban-based and kitchen garden	207,479	36,147	146
All projects	12,564,774	36,952,903	79.2

† Farm categories from J. Dixon, A. Gulliver, and D. Gibbon, *Farming Systems and Poverty* (Rome: United Nations Food and Agriculture Organization, 2001).

‡ Yield data from 360 crop-project combinations; reported as percent increase (thus a 100 percent increase is a doubling of yields).

Source: J. Pretty, A. D., Noble, D. Bossio, J. Dixon, R. E. Hine, F. W. T. Penning de Vries, and J. I. L. Morison, "Resource-conserving agriculture increases yields in developing counties," *Environmental Science & Technology* 3, no. 1 (2006): 24-4

Gender Integration and Impacts

The Water Reuse, crop packaging and grading to be implemented through local women and NGOs 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/Fifa and Khnaizerah have Water User Associations (who have amongst their members some women farmers).

Amongst major gender-integration and impact issues, the Project is addressing in the context of national capacity building and development at 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.

(1.6) 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.

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

Project Beneficiaries:

The most vulnerable communities and groups to benefit from this project are: Agribusiness producers such as the Jordan Exporters and Producers Association for Fruit and Vegetables (JEPA), WUAs in the Jordan Valley under the JVWF, farmers, Agricultural Credit Corporation SMEs, farm workers, and indirectly population of the Jordan Valley.

The program also includes an Impact Evaluation component, where randomization will be used. Six WUAs will be strategically selected through stakeholders consultation 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.

Examples of specific sector impacts are:

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.

- 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.

Criteria to be applied to determine the vulnerability of the Targeted Community (Poverty Pockets):

For each of the project components a criteria was and will continue tobe applied to determine the vulnerability of the target communities that will be governed by the following:

- Climate change vulnerability mapping generated via research institutions and the **second and third National Communications 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 extent of the vulnerability of the target communities to climate change
- **Department of Statistics "State of Poverty In Jordan Report-2012**" this report is based on the updates to the 2010 surveys
- How willing is a community to get organized through (a) local NGO(s)
- 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) supported by MOPIC**
- 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)

Poverty is defined as the inability of a person to satisfy the basic needs which will secure a descent life. Basic needs include: food, cloths, shelter, healthcare, education & transportation. And these are the necessities to keep a person alive and preserve his dignity and enable him to perform the daily activities which go along with the norms and culture in that specific society.

The methodology of measuring poverty line which is also certified in Jordan is the measurement of calories needed for a person, moreover surveying the expenditures & families Income is the optimum methodology to measure poverty indicators. Refer to Table (B1).

In line with the share in total population, Amman governorate (39.5%) is home to 24.6% of the total poor population, though only 8.3% of its population is below the poverty line. Together Amman, Irbid and Zarqa, the three most densely populated governorates in Jordan have around 57% of persons living under the poverty line.

Table (B1): Summary of some poverty indicators based on DOS report

Indicator	2008	2010
Average Jordanian need of calories per day	2325	2347
Average cost (in JDs) of 1,000 calories among all population...	0.4321	0.5121
The food poverty line in JDs per person per year	292	336
The food poverty line in JDs per person per month	24.3	28.0
General Poverty line in JDs per person per year	680	814
General Poverty line in JDs per person per month	56.7	67.8
The proportion of the poor population to the population of the Kingdom	13.3	14.4
Average family size	5.7	5.4
Average Annual Family expenditure	8617	9240
The average annual household income	7911	8842
Average annual income per capita	1350.5	1647
Gini Coefficient	0.393	0.376

N.B: Number of poverty pockets (defined as districts/sub-districts with 25% population or more below the national poverty line) increased from 22 poverty pockets in 2006 to 32 poverty pockets in 2008.

Non-monetary poverty indicators, i.e. social aspects of poverty that include attitudes, perceptions, concern about living conditions and quality of life, social interaction, access to quality health and education and efficient and equitable social safety nets are also taken in to consideration during the selection process of the targeted communities.

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.

Treated Wastewater Reuse projects (Selection of Targeted Communities)

The largest Integrated Water Resources Management project components through Recycled (reclaimed) water reuse will be implemented in Wadi Musa which is located in northern Petra in Maan Governorate. Referring to Table (B-2) below the poverty rates in Maan is one of the highest rates where it reached 26.6%. This project will provide water which will 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.

- Several 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.
- 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.
- 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:
- 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.
- 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.
- 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.
- 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.

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

Project (1.5) water harvesting technologies in poverty pockets

The Water Reuse and Rainwater Harvesting Implementation Activities will also have an impact on the employment and improved environment for women who reside and work in the vicinity of the Project Implementation Sites. Rainwater harvesting could be one of the very good options for irrigating crops specially in poverty pocket areas such as:

- **Ghour Al Mazraha/Ghore Hadeetha (Khanzeerah)** 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.
- 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%).
- 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, and Khnaizerah 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.

Table :(B2) Number of poor people distribution according to Governerates / The proposed projects will take place in the governorates highlighted in yellow

Governerate	% of extreme poverty	#of poor people	% of Poverty

Capital	0.25	268545	11.4
Balqa	0.00	85494	20.9
Al Zarqa	0.34	128055	14.1
Madaba	0.00	23347	15.1
Irbid	0.10	163933	15.0
Al Mafraq	1.27	54570	19.2
Jarash	0.00	11998	20.3
Ajloon	0.26	37752	25.6
Al Karak	0.59	31581	13.4
Al Tafilah	0.33	14244	17.2
Maan	2.68	30966	26.6
Aqaba	0.60	26104	19.2
Kingdom	0.32	876590	14.4

Source: Department of Statistics/ poverty statistics division

(2.3) 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 results indicate a disparity in poverty rates among the 89 districts of the kingdom's which are spread over 12 governorates, where it reached the maximum in both the Araba Valley in Aqaba Governorate (71.5%) and Ruwaished sub-district in Mafraq Governorate (69.6%).An analysis of the poorest districts in 2010, noted that 22 districts out of 27 exceeded the proportion of 25% in poor population, and the highest rate of poverty reached 71.5% in Araba Valley.

Table (B3) The poverty rate in the poorest districts in 2010 by administrative divisions (with projects locations highlighted)

% poverty Rate	District	Number
71.5	Araba Valley	1
69.6	Al Ruwaished	2
61.9	Al Safi Valley	3
52.5	Al Husaineyah	4
50.5	Al Marega	5

48.3	Eil	6
47.5	Al Desah	7
44.7	Al Saleheya	8
42.8	Dair Al Kahed	9
36.0	North of Shouneh	10
33.9	Arjan	11
33.8	Al Jafer	12
31.7	Al Dulail	13
31.1	Al Querah	14
30.0	Busairah	15
29.9	Dair Alla (Tal Mantah)	16
29.5	Ain Al Basha	17
28.6	Al Mujeb	18
28.0	Qasabet Ajloon	19
26.5	Athrah (Maan)	20
26.5	Um Al Qutian	21
25.1	Al Ramtha	22
22.5	Saqra	23
21.5	Qasabet Maan	24
21.4	AlMazraa Valley	25
17.6	Um Al Jimal	26
14.2	Sabha	27

Source: Department of Statistics/ poverty statistics division 2012

Cost-effectiveness of the proposed project / programme.

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

Climate change adaptation cost benefit analysis

Jordan's position in this regards goes in line with the definition of adaptation costs, which are defined as "the costs of planning, preparing for, facilitating, and implementing adaptation measures, including transition costs," and defines benefits as "the avoided damage costs or the accrued benefits following the adoption and implementation of adaptation measures". The socio-economic impacts of climate change did not receive much special attention from relevant

research and policy related activities performed in Jordan, except some limited analysis in the 2nd National Communication.

Jordan believes that how much adaptation might cost, and how large its benefits might be, are issues that are increasingly relevant both for on-the-ground projects in Jordan and in national and international contexts. Cost benefit analysis of adaptation measures is generally conducted at the sector level. The following principles to be applied:

- Adaptation efforts need to rest on a sound economic basis. From an economic perspective, adaptation could be evaluated in terms of whether, and by how much, the benefits of such actions exceed the costs incurred;
- Some adaptations can be implemented at low cost but others, such as infrastructural Measures will require significant investment;
- Adaptation policy is about much more than costing & financing establishing incentives is also critical,
- Public private partnership can help provide infrastructure for adaptation and help "climate-proof" existing infrastructure;

Jordan emphasizes that, adaptation measures also address problems that are not related nor caused by climate change, in particular in the water sector to balance supply and demand (no-regret measures). These measures by default also make the water sector more resilient to climate change. The adaptation-related costs of these measures are often small compared to the overall costs.

Proposed capital investments is focused on addressing climate change impacts and adverse effects, through innovative techniques and pilot activities that would ultimately lead to increased cost-effectiveness. The involvement of local communities community organizations and women/youth and stakeholder engagement, in the non technical (soft) aspects of the activities, would lead to higher return on investment. Cost-effectiveness will be further analyzed during project implementation and updated based on real cost figures which will be collected in the detailed work plan ahead of implementation.

The proposed adaptation techniques to be implemented by the project, namely: rainwater Harvesting, sound irrigation, rangeland management, and agro management adaptation techniques are all proven to be effective in enhancing resilience of communities to climate change, resulting in enhanced agricultural productivity, and sustainable use of natural resources thus assuring that the investments have relatively secure results whereby the project funds are

not being used on testing technologies with unknown effectiveness.

As the project activities are a mix of technical support, and investments that areoriented to maximize the adaptation impacts in a cost-effective manner. Almost half - of the budget is dedicated to field implementation of needed infrastructure, enhanced irrigation systems and materials, and services that will directly benefit the targeted farmers and local communities. Around one third of the budget is allocated to enhancing the technical capacities and know how on adaptation, and providing soft infrastructure and tools to relevant national and local institutions through use of ICT, investment in a climate change early warning system, support for a CC adaptation Fund, and agro systems support (cold storage, grading and packaging regional centers) all of which will ultimately help in community resilience to climate change. The remaining funds are allocated to policy advocacy, governance through support to WUAs of the JVWF and Wadi Mousa WUA and knowledge management to ensure proper dissemination and potential replication of the project results and experiences gained.

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

- The effluent produced by the 29 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 will require the organization of farmers and other stakeholders into associations to promote their common interests. Public Private Dialogue, 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;
- **Cost per m3 of treated wastewater in the JV ranges between 15-23 Piasters $ 21.1-32.4 for Wadi Mousa it is 14.12 US cents/m3**

Water prices according to the volume abstracted in private agricultural wells.

Quantity of water pumped	Water prices in wells with former abstraction license —2002 bylaw	Water prices in wells with former abstraction license —2004 amendment	Water prices in wells without former abstraction license
0–100,000 m^3	Free	Free	$0.035/$m^3$ (JD 0.025)
101,000 –150,000 m^3			$0.042/$m^3$ (JD 0.03)
151,000–200,000 m^3	$0.035 m^3 (JD 0.025)	$0.007/$m^3$ (JD 0.005)	$0.05/$m^3$ (JD 0.035)
More than 200,000 m^3	$0.085/$m^3$ (JD 0.06)	$0.085/$m^3$ (JD 0.06)	$0.098/$m^3$ (JD 0.07)

Source: THKJ and MWI 2002b, 2004a: as mentioned in bylaw No.85 of 2002

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Crop-wise Water Prices and Water Costs in the Jordan Valley (Northern and Middle Directorates)

	Vegetable farms	Citrus farms	Banana farms	Weighed average*
Average water price per cubic meter	$0.013 (JD 0.009)	$0.014 (JD 0.010)	($0.023) JD 0.016	$0.018 (JD 0.013)
Total water costs per hectare and per year	$67 (JD 47)	$138 (JD 97)	$350 (JD 245)	$303 (JD 212)

Note: * Evaluation based on irrigated areas in the northern and middle directorates as given in appendix 3

- The socioeconomic assessment indicates at a potential for substantial income and employment benefits that 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 of results from the WAdi Mousa socio-economic study and the JV WUAs status and constraints conducted by GIZ are 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 expected to include:

- Rain fed farmers with small holdings;
- Retired public officials;
- Sheep and goat raisers and herders and local NGOs including female NGOs;
- 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.

While the socioeconomic analysis address 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 as enhanced irrigation systems are introduced and crop production begins. 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. While for the JV farmers enhanced access to irrigation techniques, gradual removal of agricultural export and marketing barriers, coupled with better packing and cold storage facilities will lead to better income on the farm level.

Development of Regional Market for Fodder Crops

The Ministry of Agriculture reports no green fodder crop production in the Wadi Mousa 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 further 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 to be employed. In addition, many temporary laborers will be 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 also with the objective of exploring how the local community perceives the use of reclaimed water in agricultural production.

Selecting the most feasible reuse strategy for project (1.4):

Consultations with stakeholders show that their preferences range between selling the surplus TWW to benefit nearby farmers, growing crops on site for the direct benefit of the WWTP operator, selling it to farms or users further away or a combination of the above. Local and national stakeholders indicated their preference for on-site reuse as it generates the greatest revenues and can cover a higher percentage of the operating costs than any of the other options – this means that charges to users of the WWTP effluent are minimized. The precise crops and farming technology that will be used will also be selected in close cooperation with local stakeholders in order to maximize revenues.

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) Total $ 5,900,000 and for component (2) it is $1,900,000 broken down as follows:

Component 1: Total $ 5,900,000

1. Wadi Mousa Waste waster Reuse (1.1) = $1,732,461.6
2. Northern Jordan Valley Waste waster Reuse (1.2) = $1,170,000
3. Tal Al Mantah Waste waster Reuse (1.3) = $ 840,420.419
4. North of Shouneh Waste waster Reuse (1.4) = $ 530,000
5. Rain water Harvesting harvesting technologies in poverty pockets (1.5) = $ 627,118
6. Climate Change Adaptation, Building Resilient Food Security Systems through Extending Permaculture Design and Technologies in The Jordan Valley and Beyond." (1.6) = $1,000,000

Component 2: Total $1,900,000

1. Capacity Building & Awareness (2.1) = $ 200,000
2. ICT for Climate Change (2.2) = $ 550,000
3. Jordan Valley Water Sustainability and Agribusiness Competitiveness(2.3)= $1,150,000

According to the Ministry of Water and Irrigation, the annual running and maintenance of infrastructure development and operation cost is around US$102.3 per capita. Water and sanitation

Alternatives to Cost

Planned capital investments by the ministry of Water and Irrigation (WAJ and JVA) FY 2015.

The MWI (JVA and WAJ) capital investment plan for FY2015 requests the following project related funds:.

- Percent of available treated wastewater to available water supplies is 47% in the central regions versus 37% in the northern governorates
- The infrastructure investment plan for the wastewater is $20,762,711
- Operation and maintenance of WWTPs for Maan Governorate (where Wadi Mousa

WWTP is located) $706,000

- Disi water Supply Conveyor system $127,000,000, Under a Build Operate and Transfer (BOT) system between the Government of Jordan and Disi Water Company this project has now been completed which will augment the drinking water primarily in Amman and surrounding areas. Through this project around 100 (MCM) mil cubic meter of water per year will be pumped from a non renewable fossil aquifer.
  In addition to the above major infrastructure project there are certain communal level projects undertaken by Humanitarian agencies as part of Syrian Refugee Response plan.
- Pumping systems for water wells in the southern region $75000
- Karama Dam water desalination and operation $282,000 (southern Valley)
- Construction of a water desalination unit in Deir Alla (middle Valley) $750,000
- Brakish water desalination and operating the desalination units in the middle valley 141,000
- Well drilling and operation at kafrein 282,000
- Enhanced water sanitation systems in the southern governorates $750,000
- Operation and maintenance contract for Wadi Mousa WWTP $1,000,000
- Rehabilitation of WWTPs around the kingdom $2,118,644
- Wastewater reuse systems for the northern region 6,355,9332
- Water networks for poverty pockets 500,000 harvesting
- Rain water dams around the kingdom 100,000
- Water desalination systems 112,900

Total (direct and indirect) related investment needs $217,599,587 as compared to AF project requested funding of $9,226,000

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, 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.

Jordan's MDGs and the recommendations of the National Self Assessment Report 2010 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.

Furthermore the Water Strategy for Jordan (Water for Life 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.

And so the **reuse of treated wastewater** is an essential element of Jordan's water strategy which indicates 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).And so within the increasing limitations of available water resources, treated wastewater should be the most important source of water in irrigation in the near future.Moreover, 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%.

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.
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 the Enhanced Productivity Centers (EPC) program, Community Empowerment Program in Poverty Pockets, Small and Micro-finance Program, and their related 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**.**

According to the 2009 National Agriculture Strategy, and the follow on Agriculture Sector Strategy 2011-2013, 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.

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 (1- 4) under component 1 subcomponent (A) we find that the project is fully aligned with the national strategic objectives in terms of inclusive growth and environmental sustainability. The Minister of Water and Irrigation stated 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, project (2.3) under component 2 is expected to achieve & implement these objectives . 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.

Jordan, having signed the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and ratified it in 1993 and having acceded the Kyoto Protocol as non-Annex-I country in 2003, has maintained and will continue maintaining strong commitment to the objectives developed by the international community for the integrated environmental and economic response to the threat of climate change although Jordan contribution to GHGs are equivalent to less than 20 million tons of CO2eq (2000) i.e with only a marginal emission rate of 0.01% of total

global emissions. However, Committed to its role and reputation as a global pioneer in the implementation of the various UN conventions, Jordan believes it has a major responsibility in addressing Climate Change challenges while adhering to its national priorities and developmental objectives.

The Ministry of Environment (MoEnv) of Jordan has strengthened the policy and legal frameworks in Jordan to foster compliance with the three Rio Conventions, including the UNFCCC.

- The long term goal of the climate change policy and sector strategic guidance framework of the Hashemite kingdom of Jordan in short policy is to achieve a pro-active, climate risk-resilient Jordan, to remain with a low carbon but growing economy, with healthy, sustainable, resilient communities, sustainable water and agricultural resources, and thriving and productive ecosystems in the path towards sustainable development.
- The objective of the **climate change policy (2013-2020)** is to build the adaptive capacity of communities & institutions in Jordan with consideration of Gender and addressing the needs of vulnerable groups, to increase the resilience of natural ecosystems and water as well as agricultural resources to climate change, projects (2.1,2.2) is designed to implement & reach these objectives.
- The national priorities and the pillars of climate change policy are adaptation to climate change & mitigation of greenhouse emissions with an emphasis on adaptation as the imperative track.

Jordan and vulnerability, impact, and adaptation to climate change

Jordan faces vulnerability and potential serious impacts on its natural ecosystems, on its river basins and watersheds, on biodiversity—then cascading to impacts on agriculture and food security/production, water resources, human health, public infrastructure, human settlements and socio-economic framework. Adaptation actions to be taken to secure that the people and the economic, social and natural systems in Jordan will not suffer from climate change impacts.

Objectives for vulnerability, impact, and adaptation to climate change

- Further increase the scientific knowledge of climate change vulnerability and impact on water, agriculture, / food production, health, biodiversity desertification and other relevant sectors, with water and agriculture as the key sectors. This will include the link between climate change adaptation and disaster risk;

- Develop national &Regional capacity to address climate change risks.
- Develop adaptation strategies in all relevant vulnerable sectors and work towards integarations/ filling gaps of climate change aspects into relevant sectors, existing adaptation policies and strategies as well as action plans.
- Promote access to national & international financing for adaptation projects, including mainstreaming climate consideration in the allocation of national budgets.

Objectives for awareness, education and research in relation to climate change:

- Jordan research portfolio on Climate Change to be strengthened. Policy supporting research to be promoted to bridge the gap between research and policy makers resulting in informed and scientifically justified resolutions by policy makers;

- Awareness campaigns to accompany the implementation of adaptation & mitigation measures and target all relevant stakeholders, including communities and the private sector where the media to play a key role in this regard; and

- The curricula of vocational training and higher education should reflect the needs for climate change adaptation professionals in the public and economic sectors that can benefit from green growth.
- The objective of the **Climate Change Policy (2013-2020)** is to build the adaptive capacity of communities and institutions in Jordan, **with consideration for gender and addressing the needs of vulnerable groups, to increase the resilience of natural ecosystems and water as well as agricultural resources to climate change, and to optimize mitigation opportunities.**

Jordan institutional approach, however, is fragmented as the primary responsibility for climate change adaptation lies with the sector ministries (water, agriculture, health), while disaster risk reduction lies primarily with Civil Defense (Hyogo Framework for Action). In an ongoing project "Strengthening Synergies between Governance of Disaster Risk Reduction and Climate Change Adaptation in Jordan with a View to Reduce Poverty", supported by UNDP, the integration of DRR and CAA is addressed. Outputs of such project would be considered in shaping the policy for improving Jordan institutional approach in this regard.

Currently, schools curricula deal with environmental concepts and national priorities and

challenges in general and climate change issues in particular at some grades. There is a need to re-evaluate the curricula aiming at better educating the students on climate change issues. Also, in most of the Jordanian Universities, there are special departments teaching environmental sciences and management and issues related directly and indirectly to climate change. Only one specialized graduate program-offering degree related to climate change was under preparation at the time of preparing this Policy.

Only limited research activities and studies on climate change have been carried out at national universities and through funded projects so far. Some universities have started establishing climate change research programs and offering graduate degrees in this regard. The Higher Council for Science and Technology (HCST) is leading entity in the R&D in Jordan. The HCST has "finalized the ***National Science and Technology Innovation Policy and Strategy 2012-2016.*** A national research group on climate change has been established by the CB-2 Project.

The CB-2 project has analyzed the research priorities and the corresponding research guidelines, procedures, and tools needed for implementation of such research topics. The research areas identified and prioritized harmonize with provisions of this Policy as well as those of the UNFCCC.63, 64 The CB-2 Project has identified all potential cooperation mechanisms between environmental and climate change research institutions and policy making institutions.

Stakeholder Involvement

The impact of climate change to be considered by planners at all levels (national, regional and local). MoEnv to coordinate with other relevant Ministries at the national level. The regional directorates of the MoEnv, in addition to NGOs that are active on a regional level, to get more involved in regional and local activities. MoEnv and NGO's ensure the active involvement of local communities by creating cooperation networks with local associations and societies with due consideration given to gender aspects.

The role of associations of local communities in planning and implementation of development projects has to be increased, because, in particular, climate change impact and adaptation is locally determined. The MoEnv, through its regional directorates, and NGOs, through their regional branches, are actively encouraging locals participating in regional and local development planning and implementation. MoEnv, also encourages other environment societies and NGO's, to spread their activities regionally through awareness campaigns, specialized workshops and training sessions targeting local communities to be held in all governorates. Project (2.1) will focus on these activities.

JORDAN'S POSITION ON:

Awareness raising and role of the media

Background and current status: Recently, environmental awareness raising campaigns were carried out by the Ministry of Environment and other organizations. These campaigns focused mainly on various environmental issues like energy and water saving, waste minimization and waste management. Raising awareness on climate change amongst different population segments can increase support and cooperation in implementing climate change mitigation and adaptation policies. The role of the media is important to raise awareness among stakeholders in Jordan on climate change, and to inform and engage stakeholders on specific adaptation and mitigation activities. NGOs in Jordan, among which the RSCN, have done valuable work in engaging and training the media in environmental issues. The MoEnv and the sector ministries will further mainstream the role of media in climate change, and support the NGOs in their media activities.

Priorities, main measures, and instruments in awareness raising and role of the media

Support launching climate change awareness raising campaigns with emphasis on utilizing the media and other available effective communication tools to raise awareness among stakeholders in Jordan on climate change, and to inform and engage stakeholders on specific adaptation and mitigation activities. Project (2.2) will be using media & ICT to spread awareness & alert farmers on the possible climate risks they may encounter.

Vulnerable groups (with emphasis on the poor) and gender Mainstreaming

Current status:

Jordan is a signatory to and member of several key international agreements that already commit the country to gender mainstreaming. Under the UNFCCC, increased attention is paid to securing a gender perspective in international policies and initiatives. The relation of climate change with gender and poverty is apparent in the following issues:

- Dependence of such vulnerable groups on natural resources that is susceptible to climate change. 20% of the population depends on agriculture for their income. Agriculture vulnerability especially the rain fed and irrigated was also discussed in detail, these

discussions lead to the conclusion that this 20% of population which is part of the poorest segment will be most susceptible to climate change impacts;

- Dependence of communities on ecosystem services (water springs, rangelands, and natural vegetation in medicine, etc). That could be affected by climate change.
- A lack of assets which hinders effective adaptation by the poor segments of population.
- Settlements in high risk areas (drought prone) in Jordan are known to be of the lower income groups, a fact which magnifies the impact of climate change on poverty of these groups;
- Low levels of education and professional skills that prevent members of poor households for shifting to climate-resilient sources of income; and
- Regarding Gender issues role of women in economy of rural areas is known to be substantial. Women in these areas are traditionally responsible for the household economy and are active in field work as well. Any negative impact of climate change will be most sensed by women. Women make crucial contributions in agriculture and rural enterprises in dry lands as farmers, animal husbandry, workers and entrepreneurs through their indigenous knowledge.

The "Program for Mainstreaming Gender in Climate Change Effort in Jordan" was prepared in 2010 (MoEnv, IUCN). The document was endorsed by the GoJ and presented to the international community as the official stand of Jordan on the issue of gender and climate change. **The document is also endorsed by the Women's National Committee** and adopted as part of the Committee's strategy

Climate change strategic objectives to vulnerable groups and gender mainstreaming

- To integrate gender considerations and the interest of vulnerable groups in climate change policies and strategies in all relevant sectors particularly in national strategies for poverty, childhood and early childhood development in Jordan;
- To ensure that financing mechanisms on adaptation addresses the needs and conditions for implementation of poor women and men equally
- To build capacity at all levels to design and implement gender responsive climate change policies, strategies and programs.

Priorities, main measures, and instrument for mainstreaming Gender and protecting vulnerable groups

- Build capacity at all levels to design and implement gender responsive climate change policies, strategies and programs;

- Ensure that financing mechanisms on adaptation address the needs and conditions for implementation of poor women and men equally
- Develop, compile & share practical tools, information and methodologies to facilitate the integration of gender into policy and programming;
- Ensure the sector ministries will adopt the action plans suggested by the Program for Mainstreaming Gender in Climate Change Efforts in Jordan, the action plans specified the objectives, the actions and the indicators required. MoEnv and NCCC to monitor and encourage the implementation. It worthy to mention that in the preparation, design and choosing the locations of all projects under this program it was all done taking into consideration gender mainstreaming, poverty pockets areas & vulnerable groups.

THE FOLLOWING NATIONAL POLICIES WILL CONTRIBUTE TO THE CLIMATE CHANGE OBJECTIVE FORMULATED IN THE CLIMATE CHANGE POLICY AND WILL GUIDE PROJECT ACTIVITIES:

- **The sustainable development/ Planning Policy, currently under development coordinated by the MoPIC** will specify how climate change is to be considered in planning, in particular adaptation.
- **The revised national Agenda for Jordan** to address climate change.
- **The Environment Protection Law no.52 of 2006** is currently being updated and will address climate change, in particular the legal & institutional climate change arrangements in Jordan;
- **The National Poverty Reduction Strategy,** currently being revised to consider the impact of climate change on poverty with due consideration to the sex disaggregated data.
- **The priorities & actions identified under "Adaptation to climate change to sustain Jordan's MDG Achievements 2009-2013** "**National partners** were Ministry of Health (MOH), Ministry of Water and Irrigation (MWI), Ministry of Agriculture (MOA), Ministry of Education (MOE), The Ministry of Environment (MOEnv), Water Authority of Jordan (WAJ), Water supply companies, Parliament, National Center for Agricultural Research and Extension (NCARE), Zarqa Governorate, and local municipalities and communities, World Conservation Union (IUCN)
- The National adaptation action plan to be developed. There is a need to further develop the adaptation strategies and action plans on sector level. Into a comprehensive multi-sectoral **"National Climate Change Adaptation Action Plan**" through the participation and engagement of the relevant institutions and gender sensitive stakeholders including ministries of environment, water, agriculture and health, and local affected communities with emphasize on involving women organizations. This action plan is expected to address all needs in the

area of adaptation and to focus on prioritizing the proposed programs and projects on a national level. **The action plan is also expected to identify barriers to implementation of the gender sensitive adaptation measures and put forward programs, projects and mechanisms to deal with them.**

Relevant national technical standards to project / programme

E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

The National Climate Change Policy of the Hashemite kingdom of Jordan 2013-2020" highlights the relevant aspects and priorities for the Capacity Building & Awareness and the use of ICT in climate change Project as follows:

Objectives for awareness& education in relation to climate change:

- Awareness campaigns to accompany the implementation of adaptation measures and target all relevant stakeholders, including communities and the private sector where the media to play a key role in this regard; and
- The curricula of vocational training and higher education should reflect the needs for climate change adaptation professionals in the public and economic sectors that can benefit from green growth.
- The objective of the policy (2013-2020) is to build the adaptive capacity of communities and institutions in Jordan, with consideration for gender and addressing the needs of vulnerable groups, to increase the resilience of natural ecosystems and water as well as agricultural resources to climate change, and to optimize mitigation opportunities.

STAKEHOLDER INVOLVEMENT

The impact of climate change to be considered by planners at all levels (national, regional and local). MoEnv to coordinate with other relevant Ministries at the national level. The regional directorates of the MoEnv, in addition to NGOs that are active on a regional level, to get more involved in regional and local activities. MoEnv and NGO's to ensure the active involvement of local communities by creating cooperation networks with local associations and societies with due consideration given to gender aspects.

The role of associations of local communities in planning and implementation of development projects to be increased, because, in particular, climate change impact and adaptation is locally determined. The MoEnv, through its regional directorates, and NGOs (through their regional branches) will actively participate in regional and local development planning and implementation. MoEnv, and other environment societies and NGO's (spread their activities regionally). Awareness campaigns, specialized workshops and training sessions will targetlocal communities to be held in all governorates.

AWARENESS RAISING AND ROLE OF THE MEDIA

Recently, environmental awareness raising campaigns were carried out by the Ministry of Environment and other organizations. These campaigns focused mainly on various environmental issues like energy and water saving, waste minimization and waste management. Raising awareness on climate change amongst different population segments can increase support and cooperation in implementing climate change mitigation and adaptation policies. The role of the media is important to raise awareness among stakeholders in Jordan on climate change, and to inform and engage stakeholders on specific adaptation and mitigation activities. NGOs in Jordan, among which the RSCN, have done valuable work in engaging and training the media in environmental issues. The MoEnv and the sector ministries will further mainstream the role of media in climate change, and support the NGOs in their media activities.

Priorities, main measures, and instruments in awareness raising and role of the media

Support the launch of climate change awareness raising campaigns with emphasis on utilizing the media and other available effective communication tools to raise awareness among stakeholders in Jordan on climate change, and to inform and engage stakeholders on specific adaptation and mitigation activities.

The Jordanian Institute of Standards and Metrology (JSMO) 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 as a source then 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 **National Water Strategy 2008-2022** 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 governed by **WHO 2006 Guidelines**

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 Wadis
- For reuse:
- Irrigation (four categories): fruit trees & green landscape; cooked vegetables & parks; field & industrial crops; flowers.
- Groundwater recharging (not for drinking)*.
  - **JS893/2006 on "Reclaimed Domestic Water"** has two primary components: i) reclaimed water discharged to streams, wadis or water bodies and ii) reclaimed water for reuse. Reclaimed water for reuse standard in turn has two subsets. The full standard is attached in Annex 6. Reclaimed water specifications under this standard are divided in to two main parts and should conform to specified conditions for every part and according to the final planned use and it is not allowed to dilute reclaimed water by mixing it in the treatment plant with pure water to achieve the stated conditions in this specification.
  - A: Reclaimed water for Wadi (valley) discharge
  - B: Reclaimed water for reuse purposes

ordanian Standard 202/2007 **Note : No treated industrial wastewater will be utilized or reused under this project noting that industrial effluents are not allowed into municipal wastewater treatment plants**

- There is no official translation of JS 202/2007 to English See annex 5 for unofficial translation

), 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 (Law # 18/1998) 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. 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

Sludge: JS1145/1996 on "Uses of Sludge in Agriculture" describes sludge treatment methods and presents sludge quality standards for reuse in agriculture (see full standards in Appendix 5).

For using surface water Jordan follows the FAO guidelines, WHO 2006 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".**

Standard 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.

Environmental Law

Environment Protection Law No. 52 of 2006.
Law on the Water Authority No. 18 of 1988.
Underground Water Regulation No. 85 of 2002.

Regarding project (2.3): Assurance of crop safety will be required (microbiological contamination, heavy metals and nitrate) where in this regard, involving the JFDA in order to scale up their monitoring programme to cover these new areas irrigated with reclaimed water, this needs to be complemented through an ISO 17025 certification for the elements of the crop monitoring programme. Below is relevant Health laws.

Health Law

Food Law 2007
Interim law No (79) for Year 2001 Food control Law
Interim law No (79) for Year 2001 Food control Law
Provisional Law No. (97) For the Year 2001. Law of Clinical Studies
Public Health Law No. 54 of 2002.
The General Health Law (Arabic)

Regulation No. (7) Of the Year 1998, The Regulation of Forming Committees and Supervisors of Occupational Safety and Health Issued by virtue of Article (85) of the Labour Law No. (8) Of the Year 1996

Agriculture Law

Fishing Regulation No. 1 of 1944.
Interim Agriculture Law No. (44) Of year 2002
Interim Agriculture Law No. (44) Of year 2002

For details on Jordanian Laws and Regulations and those selected above refer to http://www.lexadin.nl/wlg/legis/nofr/oeur/lxwejor.htm

Section K contains more details on the project governing laws and standards. Pertinent standards details are in Annex 5

Duplication of project / programme with other funding sources

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

There is no duplication of efforts but but building on existing national and donor/lender efforts.

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 WadiMousa 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 wastewater 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, Buried Diffusers, 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

(6 **UN: Jordan: Adaptation to Climate Change to Sustain Jordan's MDG Achievements FY 2009-2013** Participating UN agencies: **FAO, UNDP, UNESCO, WHO**

Through its institutional set-up, MOPIC has the *International Cooperation Departmen*t (*one of MOPIC's 13 Departments*). The overall mandate of the *International Cooperation Departments* is to coordinator the foreign assistance, and being responsible of the mobilization and management of the foreign assistance at various sectors, programs and projects within and outside the Government of Jordan (GOJ). By law, MOPIC is the channel of communication between GOJ and international development partners, so all international external resources are to be coordinated through MOPIC, and this ensures that it is used in accordance and integration with the national development policies, and avoid duplication of efforts. More specifically, the *International Cooperation Department* provides developmental projects financing, and continuous search for financing opportunities, identifying their utilization conditions, coordinating the available financing distribution to different developmental projects and programs in

cooperation with the granting countries and parties. *International Cooperation Department* also improves cooperation relations with granting parties, and builds up relationships with new parties in order to provide technical and financial support for developmental projects in the Kingdom.

The *International Cooperation Department* includes the following divisions:

Aid Coordination Division.

- World Bank Group and United Nations Agencies Relations Division.
- American Relations Division.
- Asian Relations Division.
- Arab and Islamic Funds Division.
- European Relations Division.
- EU Partnership Division.
- Scientific and Cultural Cooperation Division.

The main responsibilities of the *International Cooperation Department* are:

- Improving aids coordination techniques, managing financing operations for different developmental projects and programs and, according to protocol monitoring the commitment of financing sources to agreed upon aids programs.
- Collecting information on Jordan needs for aids, and external economic support, and prepare analytical studies in this topic.
- Maintaining external parties' cooperation relationships to provide financial and technical support for developmental projects through setting suitable plans and programs. As well as building and developing mutual relationships with granting parties and countries in order to provide financial and technical support for developmental projects through aid programs and loans from granting parties and countries.
- Continuous search for available financing opportunities, conditions and techniques of utilizing those opportunities, continuous information update, and provide the granting parties and countries with a database.
- Finding suitable financing sources for the developmental projects taking into consideration projects nature and granting sources conditions and approaches.
- Preparing for financing agreements and/or economic and technical cooperation, following up all necessary procedures for executing annual aids programs and agreements. Studying, analyzing and solving the problems that face financing programs and agreements.
- Developing cultural relations with external parties to make use of available qualifications and expertise to fulfill human resources training needs in public sector,

in addition to preparing cultural agreements and realizing public sector needs of foreign experts.

The **proposal** will seek the synergies and integration with other ongoing foreign funded projects and activities, this will be ensured by the mandate of the **Aid Coordination Division**, in cooperation with the Bi-and Multilateral Relations divisions at the *International Cooperation Department*: The key mandates of the **Aid Coordination Division** are:

- Follow up preparation of the Medium-term Aid Planning Document and Calendar of Activities (responsibility within part of MOPIC responsible for national planning)
- Development and coordination of implementation of the National Aid Effectiveness Policy/Strategy and Action Plan
- Development of the aid coordination system & monitoring implementation (process)
- Data collection and analysis
- Hosting and management of JAIMS
- Reporting on aid flows (Jordan Foreign Assistance Report) and reporting on aid effectiveness (OECD)
- Aid visibility and transparency issues
- Secretariat for High-level Coordination Mechanism
- Collaboration with global aid effectiveness institutions and initiatives
- Facilitation of information flows on aid coordination

Moreover, the present formal Government-led sector-level coordination mechanism is already in place under the leadership of MOPIC (*through the **Aid Coordination Division**)*, it is composed of 11 sector-level Government-Donor Coordination Working Groups *(the 11 groups include: Energy; Employment and Vocational Training; Water and Agriculture; Trade and Investment; Good Governance; Health; Gender; Public Financial Management; Local Development, Tourism; and Education)*. The **proposal** will capitalize on this existing mechanism as well as other mechanism at MOPIC to seek the synergies and integration with other initiatives, donors and stakeholders

Table F: Key Donors in the Jordanian Water and Agriculture Sectors

Donor	Important Projects and Programmes
Germany	***BGR: Water Aspects in Land Use Planning**:* Results include the delineation of groundwater protection zones and the inclusion of water protection aspects in regional planning processes and licensing procedures. Groundwater monitoring and groundwater modelling are also fields of activities to enhance the water management capacities of the project partner ***GIZ: Management of Water Resources*** support and build the capacity of the GoJ, water companies and water users to manage Jordan's water resources efficiently and sustainably. GIZ supports in the fields of institutional development, service improvement, stakeholder participation and water conservation ***GIZ: Improvement of Energy Efficiency of the Water Authority of Jordan***

	works closely with the Water Authority of Jordan and uses private sector expertise and funding to achieve sustainable results in reducing the amount of electricity consumed by the WAJ (Jordan's single largest electricity consumer). ***GIZ: SWIM Sustain Water MED*** proposes to implement innovative pilot activities for treating and reusing wastewater for the benefit of the local livelihoods and sustainable water management. All pilots are accompanied by local and regional measures for capacity building and awareness raising. ***GIZ: Training for Water and Energy Efficiency Development*** supports human capacity development in the water sector by strengthening vocational training in Jordan related to water and energy efficiency. ***GIZ: Communication Strategy for the Water Sector*** support MoWI in developing a comprehensive communication strategy as part of water sector governance and reform, addressing the information needs of specific target groups. ***KfW: Financing of projects*** related to the reduction of water losses and improvement of water allocation; construction of wastewater collection systems and treatment plants, as well as the use of treated wastewater in agriculture.
USA	***Enhancing Water Awareness****:* Mobilizing grassroots action for addressing the water scarcity problem in Jordan and the need for conservation at the rural and municipal levels. ***Red Sea – Dead Sea Water Conveyance Feasibility Study and Environmental and Social Assessment*** A study to examine the technical, economic, financial and environmental feasibility of pumping seawater from the Gulf of Aqaba to the Dead Sea. A separate study will assess regional and local social and environmental impacts. ***Public Action in Water, Energy and Environment*** Effect behavioural changes among the Jordanian public and decision makers to increase efficiency in the use of water and energy, handle solid waste properly and introduce needed policy changes ***Operation and Maintenance Training Program***: Develop certification programs for water sector staffs, including training materials, and a "Training of Trainers" Program. Engage the private sector in a regional training and certification initiative ***Institutional Support & Strengthening Program*** Technical assistance and capacity building to identify and then implement a range of institutional reforms to address key institutional constraints to more effective and efficient management of the water sector, enhance financial management within the water sector, optimize water use and reduce over-exploitation of resources. This includes issues such as water valuation, and restructuring and strengthening water sector institutions with a focus on human resources, financial and facility management ***Water Reuse & Environmental Conservation Project*** Water conservation programs for industry, agriculture and landscaping. Demonstration of industrial water management and pollution prevention, site rehabilitation and institutional capacity building ***Community-Based Initiative for Water Demand Management****:* Administer a community support program to engage poor communities in water demand management by providing small grants to NGOs for revolving loans to improve household and community water facilities. It also broadens the capacities of NGOs to work on development issues
France	***Infrastructure and technical assistance*** *:* Disi Water Conveyance System Project; Groundwater-flow modelling; Highland Water Forum; Red Sea-Dead Sea Water Conveyance Study Program.
Japan	***Energy Conservation through Upgrading Water Supply Network*** in Jordan
Italy	***Feasibility studies for Water Resources Management***: Red Sea – Dead Sea Water Conveyance Feasibility Study and Environmental and Social Assessment

The World Bank	***Jordan Valley Water Forum*** is designed as a process and mechanism for multi-stakeholder engagement aimed at solving critical issues facing the water and agribusiness sectors throughout the Jordan Valley. 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.
UNDP	***Jordan National Self Assessment on Climate Change Report*** which provides a detailed assessment of the obligations and operational procedures of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol and their applications in Jordan. The primary goal of the NCSA is to identify, through a country-driven consultative process, is to establish priorities and needs for capacity building to protect the global environment. The National Capacity Self-Assessment exercise includes two key elements that are closely linked: a stocktaking of the previous National Communication work – and a stockholder's consultation ***Third National Communication Report****:* Review of the national enabling environment for implementing the UNFCCC, including legislative and institutional frameworks, human and knowledge resources, and natural and physical infrastructure.
UN (FAO, UNDP, UNESCO, WHO **)**	**Jordan: Adaptation to Climate Change to Sustain Jordan's MDG Achievements** Jordan has one of the lowest levels of water resources availability, per capita, in the world. Although the country has made advances towards achieving MDG targets, its accomplishments are being compromised as this crippling water scarcity and climate change bring additional threats to health, food security, productivity and human security. The Joint Programme was designed to address these challenges as a key to sustaining Jordan's human development gains and growth. The following programme goals were part of an overall effort to assist Jordan in sustainably managing its natural resources, reducing poverty and improving health indicators: 1. Developing sustained access to improved water supply sources, despite increasing water scarcity due to climate change. 2. Strengthening the capacity for health protection and food security under conditions of water scarcity.

The learning and knowledge management component

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 Climate 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.

The project will apply the following knowledge, dissemination and public awareness and learning tools through the implementation of the project:

- Engagement of local media in awareness campaigns and events;
- Public & school presentations and field visits;
- Climate forecasting maps
- Community briefs on integrated water resources management, communal governance and support tools, agro-forestry, use of reclaimed water for irrigation according to national standards, watershed management, conservation agriculture, drought-resilient cropping patterns, climate-resilient post-harvest practices;

- Study visits between different community groups in JV and Wadi Mousa especially under Outcome 1 in which pilot/demonstration community plots are established;
- Public media articles in journals, newspapers and newsletters;
- Awareness campaigns targeted at local NGOs, public and private sector entities;
- Training workshops and short courses on Climate Change and sustainable land management for non-governmental community leaders and local government institutions
- Policy briefs for national decision makers; and Best practice guidance materials and tools.
- Implementation of concrete adaptation actions through pilot programs to foster learning experience, which will feed into all awareness, training and knowledge management actions facilitated and conducted by the project.
- Close involvement of CBOs/NGOs, which also work in non-project target sites, will facilitate smooth replication of good practices during and after the project.
- Consultative face to face meetings and interactive events, through brochures, leaflets and posters on the effects of climate change on natural resources, and on the relationship between water management practices, agroforestry practices, agricultural cropping, post-harvest and storage practices and the resilience of the surrounding ecosystem.
- Existing awareness materials from other projects will be adopted and tailored to the target groups in the project location.

The development of M&E systems for relevant outputs/activities will be assured for effective knowledge management and sharing. Development of an M&E framework at the beginning of the project will ensure efficiency and effectiveness and gain in the knowledge management of the project outputs. An M&E specialist will be appointed to will establish detailed monitoring and tracking tools in the inception phase of the project implementation with tools devised to document and capture throughout execution of the project, lessons learned will be captured, codified and discussed among stakeholders which will enable a production of technical report from each of the technical Outputs, which will be collated as “best practice guidance materials and tools”. Periodic project briefs, annual progress reports, midterm evaluation and final evaluation results will be circulated widely for review, comments and edits as needed.

Results expected from project (2.3) also include the generation and dissemination of knowledge for how to better adapt to climate change , enhance community socio economic resilience, and ultimately improve the water sector in JV 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 JV region. 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 JV region through citizen participation in the policy-making process.

THE CONSULTATIVE PROCESS

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

Community and Stakeholders Consultations for project (1.1):

For the Wadi Mousa project**: On 9th of July 2012 MOPIC** held a consultation meeting with ***Al-Sad 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.

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.

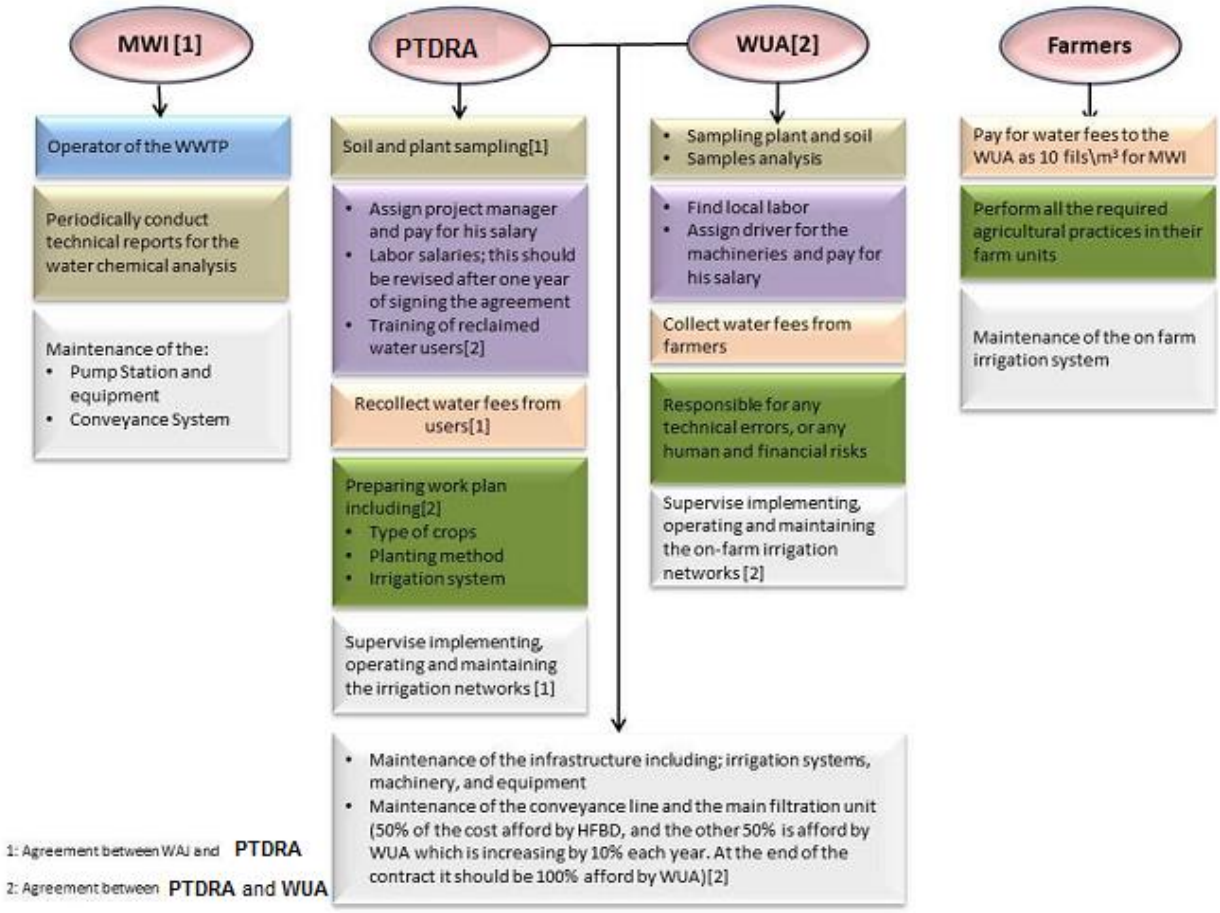
Another recent consultation meetings were held **by MOPIC on the 12th of May 2014 with steering committee of Sad Al Ahmar NGOs,** and the other meeting on the 17th of May 2014 with the members of Sad Al Ahmar NGO & representatives of the local community(farmers, WUA members & female farmers), (Annex 2 A) .

The above consultation meetings 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. Refer to Annex (2-A) to view list of participants representing Community consultation sign-up sheet and community needs". 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. The participants had also some concerns about possible impacts

. **Stakeholders Consultation and Buy-In:**

The project design team consulted with key stakeholders of Wadi Mousa water reuse pilot project who are the Water Authority of Jordan (WAJ), Petra Tourism Development Region Authority (PDTRA), Sad Al Ahmar Water Users Association (WUA), and individual farmers working in the field to solicit their feedback and share the component design elements. Petra Tourism Development Region Authority is the authority issuing permissions to grow certain plants at the pilot project site.

Responsibilities distributed among the key responsible stakeholders at the Wadi Mousa pilot project are summarized in the following schematic figure .



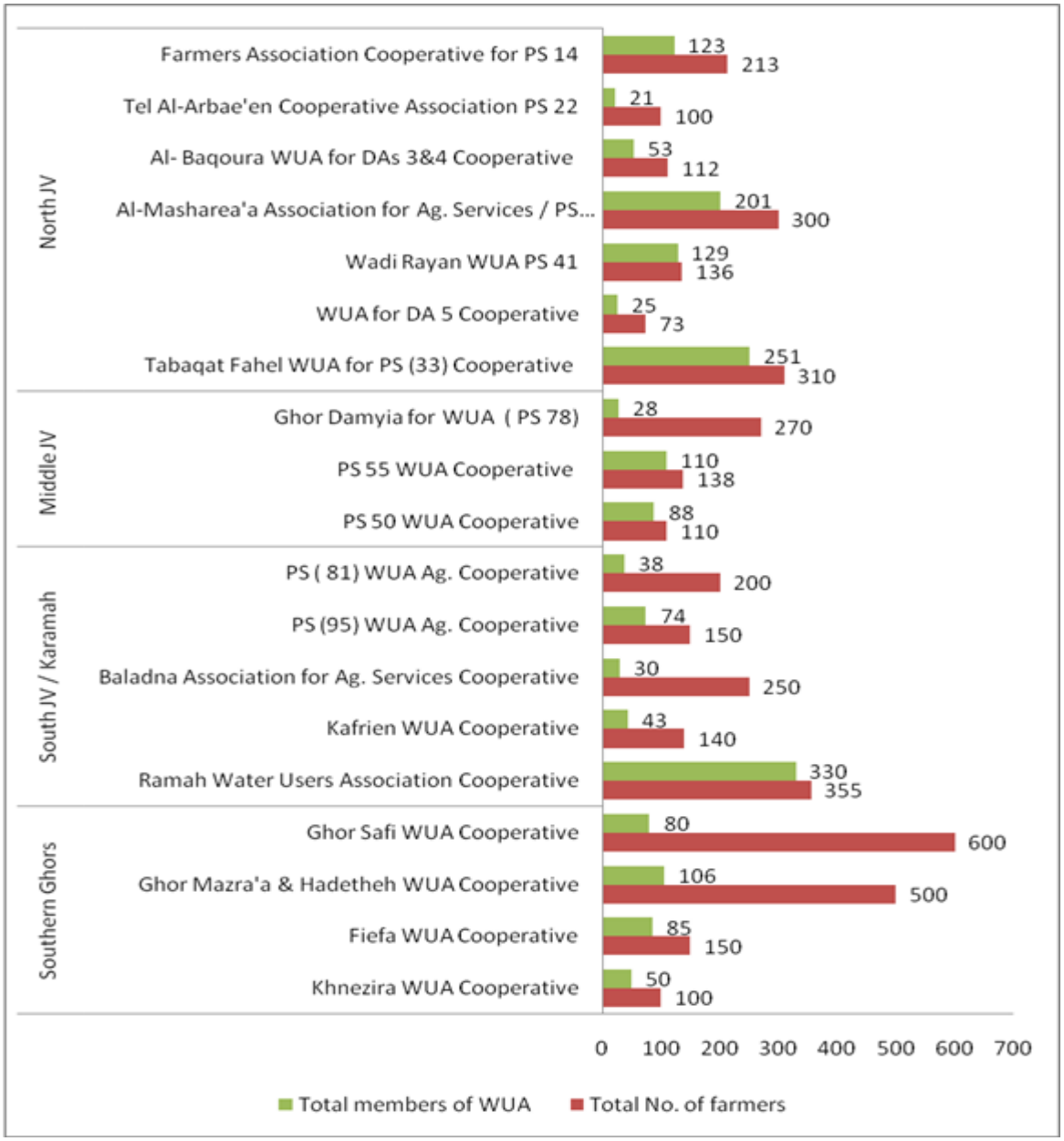
Distribution of responsibilities among farmers and stakeholders at Wadi Mousa pilot project according to the signed agreements.

The WUAs' members are the farmers within the WUA service area who opt to join the WUA. Members form the General Assembly of the respective WUA. Membership has been expanding since the inception of the initiative in 2001. The current number of member and non-member farmers in each WUA is shown in the figure Below. The total number of farmers in WUAs areas is 4207, making members 44.3% of the total in 2012 However, this ignores the fact that many farmers share farm units, and in other cases one farmer may own or operate a number of farm units. A few WUAs have membership areas nearly reaching 100%, particularly in Southern Ghors,.

There has been a steady expansion in farmers' participation in the JV since 2002. around 182,000 du (62%) of the irrigated area of the Jordan Valley has been covered by WUAs, i.e. retail water is managed with farmers' participation.

A small number of women farmers are also WUA members; Non-Jordanian farmers also operate farms in the JV; around 2% of farmers (353 farmers) are non-Jordanian (Egyptians: 90 farmers and Pakistanis: 281 farmers). Non-Jordanian farmers cannot become members of the WUAs due

to limitations in the JVA law related to ownership and renting of lands. While Jordanian land owners can become members, it is not known how many farm units operated by non-Jordanian farmers are considered members in WUAs.



The current number of member and non-member farmers in each WUA

Consultations for Project 1.2 & 1.3 are mentioned below with project (2.3).

Project 1.4 Wastewater Reuse at North Shouneh WWTP :

Several participants attended the community consultation session for the wastewater reuse at North Shouneh WWTP, Refer to Annex (2-C) to view the list of

participants.

Project (1.5) Community resilience and adaptation to climate change through water harvesting technologies in poverty pockets and local community groups.

For the Rain Water Harvesting project (1.5) the consultation process was part of the Jordan Valley Water Forums held in **June 2012 and January 2013** and whose proof of consultation is provided under the list of attendees. Refer to Annex (2-B)

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/GhoreHadeetha, 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.

Community consultation for *Project (1.6): Climate Change Adaptation, Building Resilient Food Security Systems through Extending Permaculture Design and Technologies in The Jordan Valley and Beyond.*

A meeting was held on the 11th of May 2014 with some beneficiaries & community representatives who expressed their interest in the premaculture concept & said that the methodology followed in this project will help them to sustain their families and not depend on any external source for maintaining the project in the future. They stressed on the importance of including women in these activities, and requested a mechanism that will help them to market and sell their vegetables to other Regions.

Consultations for Permaculture project

Consultation process related to component 2

- **On Monday 19th of May 2014 a meeting was held at the Ministry of Environment with Ms Andera Al Dahabi** who is responsible for the Climate Change Projects at the ministry, Ms Andera has stressed on the importance of this proposal and that through implementing many of the proposed projects the ministry of Environment achieves several goals related to its commitment & responsibility towards mainstreaming climate change adaptation plans into its environmental policy, and also aid in the capacity building activities specially in the poverty pockets areas. The Ministry of Environment role lies in managing, facilitating & supervising the work of the implementing entities as the RSS & others.

Project (2.1): Strengthened ability of remote poor communities to make informed decisions about climate change-driven hazards affecting their specific locations

- **Also on Monday 19th of May 2014 a meeting was held at the Royal Scientific society at the Environmental Research Center with Engineer Rafat Assi the managing Director**, to collect Information on their contribution towards the awareness raising & capacity building on climate change issues activities, budget possible challenges etc. Eng. Rafat has stated a great interest in such program specially that they have already a vast experience in undertaking awareness projects around Jordan.

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

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

- **On Monday 19th of May 2014 a meeting was held at the Royal Scientific society at the Information & Technology (IT) Center with Eng. Daher Daher the Director of ICT for Development Cluster**. Also with the presence of Eng. Al Zu'bi to collect Information on their contribution towards this project in terms of activities, budget possible challenges etc. Eng. Daher said they have already implemented similar project and they have excellent experience in designing software & mobile applications & also in implementing them & disseminating the information.

(2.3) Jordan Valley Water Sustainability and Agribusiness Competitiveness

On May 18, 2014 Several stakeholders were consulted for this project as well as for **projects (1.2),(1.3)** 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 WB/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.

Provide justification for funding requested,

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

According to the Second National Communication Reports and the draft third National Communication Outputs, 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 MWI/JVA, MOA, PDTRA and NCARE are all working towards meeting the national goals of their strategies for augmenting water supplies, and adapting to climate change through water reuse and rainwater harvesting in several areas around Jordan, through the construction of water catchments, and ponds. So the wastewater reuse activities proposed support these strategies. At Wadi Musa, Northern Jordan Valley, North Shouneh and Tal Mantah the farmers rely on treated wastewater to augment supplies as a result of water scarcity caused by climate change.

In GhourHaditha, Fifa and Khnaizerah and Mazrraah in the Jordan valley where farmers rely on rain fed agriculture, and on ground water for irrigation without the means for supply augmentation through rainwater-harvesting options.

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:

MOA and NCARE/RSS 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 assistance is 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 WadiMousa 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 through MOEnv., 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 path for MWI (WAJ-JVA) and PDTRA's/NCARE/RSS 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.

The sustainability of the project/programme

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

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. Sustainability of project results and outputs are an integral to the design of the Project. Governance and locals engagement are essential tools for empowerment. A strong emphasis will be placed on NGOs and community-based organizations (CBOs) in the implementation of the project to ensure participation and ownership by local communities, all of which will assure sustainability of CC adaptive measures and investments. The design of the project also emphasizes the *process* of identification of the specific locations and locally suitable designs of rainwater harvesting infrastructure, on-farm demonstrations of wastewater reuse, climate change resilient seed varieties, permaculture pilots . During the project formulation phase, representatives from the project target sites through the Sad Ahmar NGO in Wadi Mousa and the steering committee of the Jordan Valley Water Forum were consulted to verify and validate their commitment and willingness to provide in-kind co-finance, in the form of labour and locally available materials,. Contributions of in-kind co-financing was agreed on and is likely to increase the ownership, and hence, sustainability of the investments as well.

Training will be a significant component of the technical assistance plan. Stakeholder participation is essential to a successful training program. Demonstration of adaptation to climate change, poverty alleviation, food security and (youth & gender all inclusive governance) are the expected major outcomes of the project. Economic viability is an expected outcome of the training so that in the future, when it comes time to re-invest hard-earned income into renewal and replacement improvements, the pilot can be economically self-sustaining.

The approach to providing technical assistance to address economic sustainability will focus on clear definition stakeholder responsibilities; organizational management capacity that would sustain economic benefits and best practices; organizational training to maintain farmers' practice to minimize the potential health risk; and technical proficiency to operate and maintain a

productive reclaimed water irrigation system.

The primary focus will be on training farmers on better the sustainable use of treated wastewater in place of fresh water supplies as an adaptation tool to climate change but as governed by the reclaimed water reuse standard JS 289/2006, crop selection, rotation, and harvesting, and in increasing their understanding of how such changes can either make their crops more marketable or enable them to produce a self-sustaining year-round supply of feed for their own livestock. There will also be training on the public health aspects in terms of hygiene, financial responsibility, accountability, and planning, as needed, to achieve economic viability

It is important to understand that long-term solutions must be culturally consistent with the traditions of the Bedouin people of the Wadi Mousa area. Such activities may involve the use of forage crops and native forage plants and trees in a way that can provide a year-round, self-sustaining supply of feed that can support herding and raising livestock and other on farm productive activities such as dairy and honey production. Landscaping through re-introduction of native trees will also be utilized by the Petra Development Tourism Regional Authority (PDTRA). Traditional farming, coupled with modern jobs related to the tourism and service trades generated from nearby Petra, are the primary livelihoods for the residents of Wadi Mousa

Socioeconomic Status Monitoring:

Achieving the sustainability of the Wadi Mousa pilot project is a main objective of PDTRA. Because it is clear that the project sustainability depends mainly on the benefits of the project, it is important to encourage the practices that will eventually result in optimizing farmer benefits. A socioeconomic study will be conducted to evaluate the current socioeconomic status of the Wadi Mousa farmers and to monitor the success of the technical assistance. The evaluation will include the social and tribal status, income, family members, and economical status for both farmers and the WUA staff. The WUA will be evaluated for the number of members and the beneficiaries as well as the financial sustainability and the association's governance. The scope of the survey will be developed in consultation with the WUA and (PDTRA) and nearby Al Hussein Bin Talal University academia

The economic return and gain of livestock breeding stems from the value of its products which is considered as a necessity for the farmers and shepherds' subsistence. A good example of this could be the production of meat, milk, wool and leather.

Shepherds in rural communities depends on livestock breeding for their livelihoods as it contributes significantly in raising their living standards, income and economic status for them and their families. Unfortunately, the recent changes in the weather patterns caused severe

droughts and loss of vegetation and plant cover. These circumstances has shortened the grazing season which pushed shepherds to shift for feed concentrates that are imported from abroad which in turn has caused a rise in prices of raising sheep, workers' wages, veterinary medicinal & vaccines.

Sadly this forced shepherds to abandon livestock breeding or reduce the numbers of sheep which affected the growth & development in this sector.

Livestock Breeding "Which is An activity under project "1.1"): It was agreed to raise 200 sheep to be fed later on fodder produced onsite. Raising sheep is considered as a profitable project for the association and also beneficial for the members who didn't have the chance yet to get advantage of this activity, keeping in mind that those members have vast experience in Livestock Breeding; this fact will definitely strengthen & sustain this project proposal.

Farmers Revolving 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 maybe 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).**

All the information mentioned applies to all projects under Component (1) Sub Component (A)

Project **(1.6)** The JV Permaculture as a Jordan Valley cross cutting initiative as well as the other proposed projects 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 farms and household gardens.

A revolving fund to be developed under project 1.6.will be established. However the details about the number of revolving loans that will be granted, in addition to other information as the payback period allowed and the requirements needed will be discussed with the farmers union, "Agriculture Credit Corporation (ACC)" and 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 two pilot farms 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 & Permaculture 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 regional management 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.

K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.

Risks associated with treated wastewater reuse in Jordan

For the proposed sub projects in the Jordan Valley: Prior to allowing ww reuse in the JV, the Water Authority and Ministry of Water and irrigation prepared a study funded by the KFW for the Reuse of treated wastewater in irrigated agriculture in the Jordan Valley in October 2004 and executed by GIETECH Germany, AHT International –Germany and Consulting Engineering Centre in Jordan where the JV agronomy, soil, crop demands, irrigation systems and drainage systems were assessed and alternatives developed with view to sludge management and an EIA was conducted to comply with JS/893/2002. The study was later updated by the same group to meet new design and effluent discharge and reuse plan and quality of JS 893/2006 and be in harmony with the new investments in enhanced WWTPs supplying treated effluent. Also the USAID funded BOT $ 175 million to upgrade the As Samara WWTP feeding the King Talal Reservoir (KTR) which enhanced the quality of the wastewater feeding the JV after being mixed with fresh river water and springs feeding King Abdullah Canal

All wastewater treatment plants where the project will be tapping into their treated wastewater effluent for reuse have been subjected to an EIA and Environmental Management and Mitigation Plan (EMMP) according to Ministry of Environment EIA Regulation # 37 FY 2005 which includes identifying risks on the environment and social impacts and requires identification of mitigation measures during construction and future operation of the infrastructure. Each of these WWTPs

also had a wastewater reuse master plan that complies with JS 893/2006 and the prevailing WHO guidelines at the time of the EIA. These EIAs were done under donor/lender funded WWTP where under the design and feasibility approvals process an EIA is required to meet the donor entity regulations such as Germany for the KFW funded Central Irbid WWTP in northern Jordan Valley and USAID's 22 CFR Reg 216 for the Wadi Mousa WWTP in Petra and North Shouneh WWTP. For Tal Mantah it was under Canadian CIDA funding and regulations.

The Table below is a sample of an EMMP which is part of the EIA for the North Shouneh WWTP and the associated Pilot. The EMMP identifies risks, mitigation measures, responsibility and the frequency of the actions required under the mitigation. A similar EMMP has been done and approved for Wadi Mousa, Irbid and Tal Mantah WWTP under the EIAs carried for them.

Potential impact		**Mitigation Measures**	**Responsibility**	**By when / frequency**
1.	**Positive Impacts**			
1.a.	Reduced tanker transport charges	• Select WWTP site closest to the largest septage generating residential area	Project team and municipality	• Completed
		• Maximizing revenues from on-site reuse to help keep tanker fees as low as possible.	Project team	Incorporated, to be further develop during Task 4
			WWTP&R operator(s)	Annually
1.b.	Improved public health, sanitation and pollution prevention of the wider area	• Enforcement and awareness raising of appropriate cesspit pumping	• Municipality, MoH and/or other local civil society	• During construction (awareness) • Continuously during operations (awareness & enforcement)
		• Prevention of illegal tanker discharges • See also mitigations under 1.	• Municipality, local civil society, residents, police, etc.	• Continuously during operations
		• Provide a septic tanker cleaning station on site	• Project team and WWTP operator	• Detailed design

Potential impact		Mitigation Measures	Responsibility	By when / frequency
1.c.	Employment opportunities	• Give preference for labor intensive WWTP technology and reuse activities • Give preference for local workers during construction and operation	• Project team and WWTP&R operator • Construction contractor	• Incorporated, to be further develop during bid document preparation and in institutional agreements
1.d.	Change in land values	• Ensure planting visually appealing landscape vegetation, ornamentals in and around the WWTP • Encourage sale of TWW to nearby farmers	• Project team and WWTP&R operator	• During detailed design and institutional agreements • Followed up annually by WWTP operator
1.e.	Demonstration of water reuse and improved public perception	• Provide safe reuse training for farmers • Broader awareness campaign in relation to reuse	• Project team, MoA, NCARTT, Municipality and/or other local civil society	• Prior to sale to TWW • Continuously during operations
		• Effective monitoring and enforcement of Jordanian reuse standards and safe reuse practices	• MoE, MoH, WWTP operator and WAJ	• Continuously during operations
1.f.	Prospect for sewage system in the future	• Select WWTP site that is downstream and not too far from larger, higher density residential areas	• Project team and municipality	• Completed
2.	**Potential adverse impacts during Construction**			
2.a.	Air quality and noise pollution	• Avoid excavation during high-wind conditions • Maintain/enhance low-lying vegetation inside project site and along dirt roads to trap dust • Spraying water on internal dirt tracks and any loose piles	• Construction contractor	• As and when needed during construction

Potential impact		Mitigation Measures	Responsibility	By when / frequency
		• Minimize excavations and maximize on-site fill	• Project team during detailed design	• During detailed design
		• Develop a transportation and disposal plan • Ensure all trucks are covered	• Project team, construction contractor and municipality	• Prior to construction (included as part of the bid documents)
		• Loud construction activities and off-site transportation should not be allowed to start in the very early morning nor to persist into the late night.	• Construction contractor, monitored by the Military and Municipality	• Daily, during construction
2.b.	Disposal of construction wastes and handling of hazardous materials (and impact of construction transport on road quality)	• Avoid cross-contamination o non-hazardous wastes with hazardous wastes • Store non-hazardous construction wastes separately from excavated materials • Dispose non-hazardous construction waste safely and in a designated and approved area • Ensure proper storage of hazardous materials • Materials and equipment should be provided to clean up and properly dispose of any spills of hazardous materials • Vehicle maintenance areas should have impervious floors and materials for spill cleanup • Transport hazardous materials in small quantities • Use approved dump-sites for each type of waste • Provide appropriate on-site sanitary facilities • Construction transport plans (e.g. for excavated materials) should take into account access routes and road quality.	• Construction contractor • Waste specific dump-sites to be approved by the Municipality and ministry of environment	• During construction, monitored on a monthly basis by the municipality and ministry of environment

Potential impact		Mitigation Measures	Responsibility	By when / frequency
		• Inspect access routs prior to construction, improve as needed • Rehabilitate the damaged road sections after construction.	• Municipality in consultation with the construction contractor (based on the transport plan)	• Prior to and after construction as needed
2.c.	Health & safety risks	• Off-site transport / disposal plans developed should carefully consider public safety / traffic accident risks • Any heavily used transport routes should be fitted with appropriate “construction activity” warning signs • Inform nearby farmers, military personnel and residents of potential risks to them and inform them about the construction/transportation schedules	• Construction contractor, approved by the local traffic department, ministry of health and municipality – the municipality should share the plans/relevant H&S information with relevant members of the public and advise them to be careful	• Prior to construction – specified in the bid documents by the project team

Potential impact		Mitigation Measures	Responsibility	By when / frequency
		• Occupational health and safety standards should be followed during all construction activities in accordance with the "Code of Safety for Construction Works • Provide on-site workers with gloves, noise attenuators, dust masks, steel-tipped shoes and hard hats, in addition to sanitary facilities and clean water • Use of clear and visible warning signs inside the construction site and protective railings where needed • Avoid working during peak heat hours in summer; enforce applicable regulation on temperature related working-hours • Provide sufficient, clean water for drinking purposes • Provide on-site capability to treat affected individuals (first-aid, anti-venom, medical kits)	• Contractor, in cooperation with / under the monitoring of the MoH	• During construction
		• Work with the military to ascertain the absence of mines on site and the surrounding area prior to excavation works	• Construction contractor in cooperation with the relevant local military command	• Prior to construction
		• Provide on-site capability to treat affected individuals (first-aid, anti-venom, medical kits) • Investigate nearest hospital/clinic for treatment of snake and scorpion bites • Inspect worker health prior to commencement of work • Provide H&S awareness and contingency plans for workers	• Construction contractor in cooperation with the MoH	• Prior to construction
2.d.	Change in local hydrology, structural and earthquake risks	• Adhere strictly to the requirements stipulated in National Building Code for Loads and Forces (for Region A) in WWTP design and construction • Ensure proper flood control measures are taken and/or temporary drainage channels are built and that top soils storage	• Project design team and construction contractor	• During detailed design and prior to construction

Potential impact		Mitigation Measures	Responsibility	By when / frequency
		locations are away from potential surface runoff areas for future reuse on-site		
2.e.	Archeological disturbance	• Carry out a rapid survey of the site and determine the risk of encountering any potentially undiscovered sites and determine any follow-up (e.g. training of workers, random spot-checks during excavations) • Look into the cemetery indicated on DLS property maps	• DoA in cooperation with the project team and construction contractor	• At least 3 months prior to construction
2.f.	Ecological disturbance	• Prohibit construction workers from trapping birds	• Construction contractor	• During construction
3.	**Potential adverse impacts during WWT&R operation**			
3.a.	Soil and water resource contamination in general	• See **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.** and **Error! Reference source not found.**		
3.b.	Contamination from accidental spills, overflows and seepages	• Incorporate various built-in design mitigations	• Project team	• During detailed design
		• Install groundwater monitoring wells • Install seepage/leakage detection piezometers	• Project team and contractor, in cooperation with WAJ	• As early as possible (for wells) • Piezometers after construction/prior to operation
		• Collect adequate groundwater quality baseline data	• WAJ & MoE in cooperation with Project Team	• As early as possible

Potential impact		Mitigation Measures	Responsibility	By when / frequency
		• Carry out regular inspections and routine tests • See also **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.** and **Error! Reference source not found.**	• WWTP operator	• Regularly during operations, frequency TBD during development of O&M manual by project team
3.c.	Contamination from TWW discharges to the Wadi	• Incorporate various built-in design mitigations • Maximize on-site re-use	• Project team	• During detailed design
		• Encourage sale of TWW to nearby farmers • See also **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.** and **Error! Reference source not found.**	• Project team and WWTP operator	• During Task 4 work and once in operation
		• Ensure strict compliance with JS893/2002 wadi discharge standards	• WWTP operator and monitoring agencies	• Monitoring as per JS893/2002
3.d.	Contamination from reuse of TWW in irrigation	• Begin the water reuse activity only after the WWTP has been deemed to perform satisfactorily and preliminary test results show compliance with JS893/2002. • Design and put in place appropriate irrigation (and Nitrogen management) management systems and scheduling along with soil and TWW quality monitoring.	• Project team	• During detailed design • Revisited and refined if needed after initial operation

Potential impact		Mitigation Measures	Responsibility	By when / frequency
		• Adjust irrigation scheduling, management as needed based on soil and TWW monitoring results and with changes in cropping patterns • Monitoring soil salinity levels to determine leaching requirements. • See also **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.** and **Error! Reference source not found.**	• WWTP operator, reuse contractor(s) in cooperation with MoA/NCART	• Annually
3.e.	Contamination from sludge reuse and disposal	• Treat sludge to first or second level in accordance with JS 1145/1996: (1) 1st level: dry wet sludge on sludge drying beds followed by storage in piles (2) 2nd level: treat sludge by composting (temperature of at least 55°C for 15 days) • Carry out sampling and analysis in accordance with 1145/1996 • Plan and obtain approval for reuse • In case of sludge disposal, identify nearest suitable disposal site/landfill • See also **Error! Reference source not found.**	• Project team and WWTP operator, monitoring by relevant authorities	• Develop treatment / reuse/disposal plan during initial year of operation • Continuously as required thereafter
3.f.	Odors	• Incorporate various built-in design mitigations • Plant windbreaks around site perimeter (about 2km) to minimize wind/odors • Install covers on anaerobic basins and denitrification reactors (as part of plant design)	• Project team	• During detailed design, ensure implementation after construction
		• Ensure sound plant operation overall • Provide protective masks for worker in the event of sudden odor surges	• WWTP operator, monitored by WAJ	• During operation

Potential impact		Mitigation Measures	Responsibility	By when / frequency
3.g.	Inequality of socio-economic impacts	• Give priority to farmers nearest to the WWTP for purchase of TWW and supporting them to carry out safe reuse • See also **Error! Reference source not found.**. and **Error! Reference source not found.**.	• Project team and WWTP&R operator	• During institutional agreements • Followed up annually by WWTP operator
		• Investigate the need for cross subsidies and means of implementing them	• Project team and relevant stakeholders, including tanker drivers	• During Task 4
		• Tanker charges should be openly discussed and revisited on a regular basis to ensure fair tanker charging systems	• WWTP operator, Municipality /village councils and tanker drivers	• Annually

Potential impact		Mitigation Measures	Responsibility	By when / frequency
3.h.	Health & safety	• Follow safe practices and standard operating procedures, including basic providing and requiring protective clothing • Provide basic safety training to all workers and managers • Fence off the entire site, provide protective railings and appropriate signs were needed • Properly implement the water reuse activity according to Jordanian regulations on safe reuse and in accordance with JS893/2002 • Provide regular medical check ups for all employees • Use anti-coagulants to control black rats and house mice • Provide on-site capability to treat affected individuals (first-aid, anti-venom, medical kits) • Investigate nearest hospital/clinic for treatment of snake and scorpion bites • See also **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.**, **Error! Reference source not found.** and 4.	• Project team and WWTP operator	• During operation
		• Ensure advance warning of all workers of upcoming maintenance works and ensure proper maintenance signage is put up	• WWTP operator	• Prior to maintenance activities
		• Provide tanker access from different directions, minimizing the need for all tankers to pass through any single residential area. • Routes need to be designated and committed to appropriate use by the tanker drivers. • Impose Speed restrictions	• Project team, municipality, tanker drivers and traffic police	• Prior to completion of construction • Monitoring throughout operations

Potential impact		Mitigation Measures	Responsibility	By when / frequency
3.i.	Disease vectors	• Hire local workers to the extent possible and inspect worker health prior to plant operation • Apply biological insecticide (e.g., BT *Bacillus thuringiensis*) to control mosquitoes • Apply molluscides to control snail intermediates (carriers of schistosomiasis) in ponds and lagoons • Coordinate with the MoH	• WWTP operator in cooperation with MoH and the Malaria and Schistosomiasis Dept at Ministry of Health	• Prior to WWTP operation • Frequencies to be determined by relevant authorities for disease control
4.	• **Risks to the WWTP structures and its operation**			
4.a.	Earthquakes	• Adhere strictly to the requirements stipulated in National Building Code for Loads and Forces (for Region A)	• Project team and construction contractor	• During detailed design and construction (supervision and testing)
		• Incorporate various built-in design mitigations • Provision of stand-by controls to enable isolating WW in intact units, redirect flows and/or to a standby nearby on-farm irrigation storage reservoir • Develop emergency response procedures	• Project team	• During detailed design • Revisited and refined if needed after initial operation
		• Implement emergency response and contingency plans	• WWTP operator	
4.b.	Non-residential septage and/or sudden deteriorations in effluent quality	• Incorporate various built-in design mitigations • Develop emergency response procedures	• Project team	• During detailed design • Revisited and refined if needed after initial operation

Potential impact		Mitigation Measures	Responsibility	By when / frequency
		• Raise community awareness and involve them in tanker monitoring and enforcement. • Implement targeted awareness raising for non-residential septage generators	• WWTP operator and/or other local civil society	• During construction (awareness) • Continuously during operations (awareness & enforcement)
		• Implement emergency response and contingency plans	• WWTP operator	
4.c.	Volumetric flow imbalance and sub-optimal operating capacity	• Incorporate various built-in design mitigations • Develop emergency response procedures	• Project team	• During detailed design • Revisited and refined if needed after initial operation
		• Public awareness raising to help regulate pumping (provide more balanced discharges)	• WWTP operator and/or other local civil society	• Continuously during operations
		• Develop tanker regulations	• Project team/WWTP operator and relevant stakeholders	• During Task 4, revisited annually by WWP operator and relevant stakeholders

Potential impact		Mitigation Measures	Responsibility	By when / frequency
		• Carry out routine maintenance and ensure immediate access to spare parts	• WWTP operator, monitored by WAJ	• Regularly during operations, frequencies TBD during development of O&M manual by project team
		• Implement emergency response and contingency plans	• WWTP operator	
4.d.	Flooding	• Incorporate various built-in design mitigations • Develop emergency response procedures	• Project team	• During detailed design • Revisited and refined if needed after initial operation
		• Carry out routine inspection • Implement emergency response and contingency plans	• WWTP operator	• Inspections after every summer
4.e.	Total power failure	• Investigate emergency power needs and incorporate into design as needed • Develop emergency response procedures	• Project team	• During detailed design • Revisited and refined if needed after initial operation
4.f.	Restricted access to the WWTP	• Design provisions for a dedicated off-site receiving facility to be built in the future if needed	• Project team	• During detailed design
		• Prepare designs for the off-site receiving facility and conveyor	• WWTP operator and WAJ	• After construction
		• Implement emergency response and contingency plans	• WWTP operator in cooperation with Military	• After construction

Please refer **to Annex 5 for EIA approvals** of these donors and the Ministry of Environment Jordan EIA committee reviews and approvals. The EMMP for the North Shouneh WWTP and reuse pilot above demonstrates that as part of the EIA completion requirement it ensures that the 15 principles in the AF table above are ensured in the national EIA and EMMP thus satisfying AF ESP and incompliance with its Principles. As for the details on how the proposal responds and abides to national and AF ESP where the safeguards employed below meet the ESP needs

The KTR supplies treated effluent to the Jordan Valley which is then ***mixed downstream with fresh water supplies from Jordan River (to the middle and Karamah/southrern Jordan valley) and Yarmouk river (supplying water to North Jordan Valley) through King Abdullah Canal which then irrigates the JV.*** For Southern Jordan in Fifa/Khnaizereh and Mazzrah the source water is from springs (fresh water and rain water) thus no negative impacts are envisaged there.

An overview of the Environmental and social impacts/ risks is provided in the Matrix below showing risks and their rating of the wastewater reuse in the Jordan valley as developed by the National Plan for Risk Monitoring and Management Sustem for the reuse of treated wastewater in Irrigation for Irrigated areas Upstream and (downstream of King Talal Reservoir (KTR), Nov 2011 supported by GIZ.

Risk Identification and Assessment Downstream in Jordan Valley							
Affected Target	**Risk identification and characterization**						**Basis**
	Hazard Source	**Hazard Type**	**Frequency**	**Consequence**	**Score**	**Risk Rating**	
Before farm							
Water in the Wadi and in the Canal	People:						
	Throwing waste, diapers and dead animal bodies into the Wadi and the Canal	Biological	3	3	9	Medium	Potential Incre of pathogen grown in th Canal and th Wadi
	Swimming and washing in the Wadi and the Canal	Biological	3	3	9	Medium	Deterioration water qualit
	Illegal dumping of sewage	Biological	2	4	8	Medium	Deterioration water qualit
	Disposal of picnic waste (plastic, bones, food leftover)	Biological	2	3	6	Medium	Deterioration water qualit

	Pesticides leftover cans waste (e.g. Cans of car lubricants) - farmers install pumps next to the Wadi and the Canal (risk of oil and petrol spillage)	Chemical	3	3	9	Medium	Potential introduction toxic chemical the Canal and Wadi
	Grazing nearby the Wadi and the Canal (Animals droppings)	Biological	3	3	9	Medium	Increase th pathogens gro in the Canal a the Wadi
	Mining	Chemical & Physical	2	4	8	Medium	Potential introduction toxic chemical the Canal and Wadi
	Sediments and algae	Physical & Biological	4	3	12	High	Deterioration water qualit

Risk Assessment and Management Downstream Jordan Valley							
Affected Target	**Risk identification and characterization**						**Basis**
	Hazard Source	**Hazard Type**	**Frequency**	**Consequence**	**Score**	**Risk Rating**	
Nearby Communities							
People, picnickers	RW:						
	Swimming in the Canal or in the Wadi, ignorance to source of water	Biological	3	3	9	Medium	Possibility drowning a potential illne from pathoge the Canal
	Use of RW for households purposes	Biological	2	3	6	Medium	Potential illne from pathoge the RW
Ditch Riders and JVA staff	RW-born pathogens:						
	Direct contact with RW during maintenance	Biological	3	3	9	Medium	Potential illne from pathoge the RW
On farm Level							
Farmers/	Irrigation with RW:						

Workers	Direct contact with RW through maintenance of irrigation system	Biological & chemical	4	3	12	High	Potential illne from pathoger the RW
	Washing & bathing	Biological & chemical	3	3	9	Medium	Potential illne from pathoger the RW
Collection Ponds	Farm workers:						
	Behavioral patterns: swimming, washing	Biological	3	3	9	Medium	Deterioration water quali
	Manure:						
	Soaking fresh manure in ponds	Biological	3	4	12	High	Deterioration water quali (increase o pathogens
	Animals droppings						
	Accessibility to pond by cattle and animals	Biological	2	4	8	Medium	Deterioration water quali (increase o pathogens
Fish raising/ Consumers	Heavy metals	Chemical	2	4	8	Medium	Mortality of fi Potential illne of people wh consume contaminated
	Pesticides	Chemical	2	4	8	Medium	
	NO3	Chemical	2	4	8	Medium	
	Pathogens in RW	Biological	2	4	8	Medium	

Risk Assessment and Management Downstream KTR							
Affected Target	**Risk identification and characterization**						**Basis**
	Hazard Source	**Hazard Type**	**Frequency**	**Consequence**	**Score**	**Risk Rating**	
On farm Level							
Drip irrigation system	RW:						
	Precipitation of TDS, Ca, P, HCO3 and others	Chemical	5	3	15	High	Clogging
	RW						
	TSS, Sediments and algae	Physical	5	3	15	High	Clogging

Soil	RW:						
	High salts in irrigation water, inadequate leaching, bad drainage	Chemical	4	4	16	Very High	Increase s salinity, deteriorati chemical a physical s properties
	Heavy metals in irrigation water	Chemical	2	2	4	Low	Accumulatio heavy metals soil
Ground-water wells used for drinking	RW:						
	Heavy metals	Chemical	2	3	6	Medium	Potential percolation heavy meta
	Pathogens in RW	Biological	3	4	12	High	Potential percolation pathogen
	NO3	Chemical	3	4	12	High	Potential percolation of
Animals	Drinking of RW	Biological & Chemical	3	2	6	Medium	Potential c animals' mor
	grazing on contaminated surface irrigated fresh crops	Biological	3	2	6	Medium	Potential c animals' mor

Risk Assessment and Management Downstream KTR							
Affected Target	**Risk identification and characterization**						**Basis**
	Hazard Source	**Hazard Type**	**Frequency**	**Consequence**	**Score**	**Risk Rating**	
Crops at farm level							
High crops	Irrigation with RW	Biological	2	3	6	Medium	Fruits contam by pathog
Low crops	Irrigation with RW	Biological	4	3	12	High	Fruits contam by pathog
Leaf crops	Pathogens in irrigation water	Biological	4	3	12	High	Fruits contam by pathog
	Heavy metals in irrigation water	Chemical	1	3	3	Low	Accumulati heavy meta leaves
	NO3 in irrigation water	Chemical	1	3	3	Low	Accumulati NO3 in lea
Root crops	Irrigation with RW	Biological	4	3	12	High	Fruits contam by pathog

Root crops & Leaf crops	Spreading manure on surface (farmers behavior)	Biological	4	4	16	Very High	Re-contamin source o pathogens or

Risk Assessment and Management Downstream KTR							
Affected Target	**Risk identification and characterization**						**Basis**
	Hazard Source	**Hazard Type**	**Frequency**	**Consequence**	**Score**	**Risk Rating**	
Harvesting, Handling and Marketing							
Different types of crops	Farm laborers and vendors						
	Lack of hygiene conscious	Biological	4	3	12	High	Re-contami source pathoge
	Washing and moistening harvested crops with reclaimed water	Biological	4	4	16	Very High	Re-contami source pathoge
Consumers							
Cooked Crops/ Consumers	RW, Farm laborers and vendors						
	Contaminated crops	Biological	4	3	12	High	Accumulati Pathogen crops. Pote illness f consumers contamina crops
Fresh eaten							
Vegetables/ Consumers	RW, Farm laborers and vendors,						
	Contaminated crops	Biological	4	3	12	High	Accumulati Pathogen crops. Pote illness f consumers contamina crops
Leaf crops/ Consumers	RW, Farm laborers and vendors,						
	Contaminated crops	Biological	4	4	16	Very High	Accumulati Pathogen crops. Pote illness f consumers contamina crops

Root crops/ Consumers	RW, Manure, Farm laborers and vendors						
	Contaminated crops	Biological	4	4	16	Very High	Accumulati Pathogen crops. Pote illness f consumers contamina crops

For Wadi Mousa the design and feasibility studies were conducted by the USAID engineering firm Camp Dresser and McKee with USAID funding with analysis of effluent reuse options (the source water in Wadi Mousa is strictly treated wastewater) and the wastewater reuse EIA was conducted in February 2006 for the reuse project options before it was initiated. Approval of the EIA is attached in Annex 5 noting it had an EMMP for managing the ww reuse pilot.

Climate Change Induced Risks

- The natural water scarcity in Jordan is aggravated by impacts of climate change as shown from the available metrological data which shows a decrease of 22% in total annual rainfall during the past 60 years.
- Climate change models predict an increase in evapo-transpiration of 3%, decrease in rainfall of 15%, increase in irrigation water demand of 18% and as a result decrease in water availability about 30% in the next20 years.
- The National Agenda sets Jordan's development vision till 2015, as well as UNDAF document (2008-2012), stress that Jordan's remarkable development achievements are under threat due to the crippling water scarcity, which is expected to be aggravated by climate change.
- Jordan will witness a rise in temperature, drop in rainfall, reduced ground cover, reduced water availability, heat-waves, and more frequent dust storms over the next three decades; thus bringing about additional threats to health, food security, productivity, and human security.
- There are several barriers to water sector adaptation to climate change that threaten the sustainability of Jordan's achievement of the MDGs, these include: (i) climate change risks not sufficiently taken into account within sectoral policies and investment frameworks; (ii) existing climate information, knowledge and tools are not directly relevant for supporting adaptation decisions and actions; and (iii) weak national capacity to develop sectoral adaptation responses.
- Water scarcity - already one of the world's most water-starved countries, Jordan faces increasing deterioration in the quality and quantity of its water resources;
- Severe land degradation – a result of inadequate land-use planning, urban encroachment, soil erosion and poor waste disposal methods;

To quantify the **public health risks associated with ww reuse in Jordan** JV and demonstrate the safe control and ensure compliance with international standards, The German GIZ −Jordanian Water Resources Management Programme, Use of Marginal Water Project commissioned the services of **Duncan Mara Emeritus Professor of Civil Engineering from the University of Leeds, UK to carry out an assessment on WASTEWATER USE IN JORDAN: IS IT SAFE?" during May 2011. He reviewed analytical system and data available at all the concerned authorities in Jordan that monitor ww reuse and in particular the Jordan Valley. He**

published his results and the following is his risk assessment based on the World Health Organization (WHO) Guidelines for Waste Water Use in Agriculture (2006).

Estimation of infection risks due to the consumption of wastewater-irrigated food through post-treatment

- health-protection control measures and associated pathogen reductions in the Jordan Valley:
    - On-farm pond: 1-log unit pathogen reduction
    - Drip irrigation + plastic sheeting: 4-log unit pathogen reduction
    - Pathogen die-off between last irrigation and consumption: 2-log unit pathogen reduction
    - Produce washing with clean water at home: 1-log unit pathogen reduction
    - **Thus : TOTAL PATHOGEN REDUCTION = 8 log units**

Estimation of infection risks due to consumption of wastewater-irrigated food results

- Without the 6−8 log unit pathogen reduction, the median NoroVirus (NV) infection risk is 2.6 ×10−3pppy for 0.1−1 NV per 105E. coli and 2.6 ×10−2pppy for 1−10 NV per 105E. coli − both values < the tolerable NV infection risk of 0.14 pppy for a tolerable DALY loss of 10−4pppy.
- **So, with the 6−8 log unit pathogen reduction, the risk is extremely small − less than 10^{-8}pppy**

Public Health: Estimation of infection risks due to working on wastewater-irrigated farms

- Exposure scenario used in the 2006 WHO Guidelines: involuntary ingestion of wastewater-contaminated soil particles
- Due to use of drip irrigation + plastic sheeting the JV farmers ingest very small quantities of soil − if any, but say 1−10 mg per working day
- Assume farmers are exposed for 9 months (274 days per year)
- **►QMRA results: NV infection risk of around 10^{-7}pppy with acceptable levels**

Environmental and Social Risks associated with Wastewater Reuse

Soil Salinity: Soil salinity due to application of the treated effluent is an important reuse issue that needs to be closely investigated and mitigated through mitigation measures that reduce salinity such as leaching, crop rotation and other sound environmental measures.

Risk: The reuse of treated wastewater for agricultural irrigation is often viewed as a positive means of recycling water due to the potential large volumes of water that can be used. Recycled water can have the advantage of being a constant, reliable water source and reduces the amount of water extracted from the environment however, about the impact of the quality of the recycled water, both on the crop itself and on the end users of the crops. ***Water quality issues that can create real or perceived problems in agriculture include nutrient and sodium concentrations (soil Salinity) which will if not managed properly negatively impact the viability of the soil and negatively impact the environment and land.***

Pertinent Environmental Risks

Environmental Risks and concern include the following:

- the quality of TWW for irrigation purposes
- application methods of TWW

- effect of TWW on crops and plants
- effect of TWW on soils
- effect of TWW on groundwater & eventually entering Aqaba Gulf's seawaters
- possible evaporation from facultative and maturation ponds
- attitudes and concerns towards TWW for irrigation and agriculture
- potential misuse of TWW by the general public
- operational reliability issues

Risk of Potential Contamination of Groundwater

Concerns are always raised regarding the possible contamination of groundwater due to the leaching of the TWW, following regular application for irrigation and the fate of such contaminants potentially polluting Ground water.

Risk of the Possibility of the Quantity of Reclaimed Water Exceeding Demand

Regarding the possibility of the reclaimed water quantity exceeding the irrigation demand, particularly during the winter months,

Variations in Water Quality Due to Operational Failures

Concerning the quality of the reclaimed effluent following a malfunction of the mechanical treatment process,

Over the re-contamination of the reclaimed water following treatment

The Possibility of the Reclaimed Water Failing to Comply with the End-Use Standards

Issues Concerning Public Health

Vector Breeding

- The issue of vectors related to the sludge drying beds and attraction to the pond areas
- Building water retention dams in a watershed always carries risks

Odor

Concerns over ***odors released from the treatment processes***

Issues/Risks Concerning the Pathogenic Content of the Reclaimed Water

Public health concerns over the application of the treated wastewater, in particular the potential for human contamination following contact with bacteria or other pathogens

Concerns over the Potential for Misuse of the Reclaimed Water

Storage Capacity

TWW produced during times of low demand (i.e. the winter months) exceeding storage capacity

Irrigation Management Practices

***Uphill pumping*,** Uphill pumping will be minimized to reduce costs of fuel and greenhouse gas emissions by use of diesel fuel.

Socioeconomic Risks and how they will be mitigated:

- **Water demand pressure**:.
- **Limited Jobs available for local communities**:
- **Climate change negative impacts**.
- **Low awareness of farmers and beduins on the pros and cons of ww reuse**:
- **Farmers, beduins and livestock coming in direct contact with treated wastewater:**
- Overflows of partially untreated or untreated wastewater:
- Farmers and beduins unaware of proper cropping patterns
- Farmers and beduins reject switching to reclaimed water:
- Contractors usually bring their own staff from external areas, and preventing the local community from getting the economic benefits. bor prior

Weak Water Governance:

Risks: There is a weakness in creating an enabling environment for nursing water governance as a prerequisite for integrated water resources management and for equitable and sustainable development.

Public Health & Occupational Safety Issues:

- Workers unaware of Occupational safety measures:.
- Low sanitation conditions in pilot areas: Farmers and beduins unaware of safety precautions:

Gender Risks

- In Jordan, household responsibility for water consumption is still considered to be the responsibility of the female head of house. Women cook, clean, bathe children, do the washing, tend to home gardens and determine how much water to use on each task.
- Women struggle significantly when there are water shortages which impede their ability to attend to household needs. Despite being the primary water users in the household women in rural areas are not the sole decision makers when it comes to water storage and supply.
- Also, rural women in Jordan are intricately involved in the management and use of water within the household. In all cases women still suffer from water shortages and economic constraints placed on the community due to growing water scarcity. Also Women in rural regions spend long hours every day performing tedious and mostly unpaid labor-intensive and time-consuming agricultural and domestic work.
- Women in rural areas depend on water resources both domestically and for productive uses such as agriculture and livestock breading. However women's participation in water management and decision making is still constrained

Beduins In Wadi Mousa

- Near the ruins of Petra in southern Jordan lies the Wadi Musa Water Re-Use project, a joint initiative of USAID, the Ministry of Water and Irrigation and the Petra Tourism and Regional Development Authority (PTDRA) which has considerable experience in working at the grass roots level with rural communities.
- USAID Jordan initiated the implementation activity, "Wastewater Reuse Implementation Activity" which focused on using treated effluent from wastewater treatment plants for either agriculture purposes with the intent to reduce the demand for high quality water(where USAID has funded the development of a wastewater treatment facility)
- The project will continue to address quality standards and legislative aspects impacting reuse applications and demonstrated the socio-economic viability of reuse through pilot projects/demonstration plots. In doing so, it demonstrated to decision makers and the local

communities and beduins who use the wastewater and public at large that water reuse is an effective, viable and safe component for managing Jordan's water resources. Most importantly it demonstrated that controlled reuse in Jordan can be reliable, commercially viable, socially acceptable and environmentally sustainable.

- The proposed AF funded program will work towards practical and effective approaches to the reuse of reclaimed water. It will incorporate poverty alleviation, adaptation to climate change, economic improvement and long-term project sustainability at the "grass roots" level. Changing cropping patterns from traditional crops, vegetables and fruits to moderate water consuming cash crops such as fodder, wheat and barley that can tolerate considerable climatic stress, improves marketability and management.

Risks:

Before initiating the project in Wadi MOusa, USAID in cooperation with the Hashemite Fund for Badia Development funded a Socio-economic Assessment for the Wadi Mousa Wastewater Re-use Implementation Project in 2003 prepared by Mohamed Fayez Tarawneh as socio-economist. The study identified the risks associated with: **tribal rights and tensions , and looked at land deeds and rights, the social structure and families, who has the most right to work at the pilot, community leaders who should manage community perceptions and alert the project team to sensitivities**.

Natural Resource Risks

- Leachate leakage impacting groundwater quality.
- Bird transmitted diseases (such as bird flu) and their implications to public health.

The followings are references, standards, regulations and guidelines that govern the use of the treated wastewater in Jordan:

Standard/ regulations/ guidelines	Issued by	Area of use
JS 202/2007	JISM	Industrial wastewater effluents.
JS 893/2006	JISM	The reuse of treated domestic waste-water.
JS 1145/2006	JISM	The safe use of bio-solids.
Regulation no. 18/1998	WAJ according to the wastewater by-law no 66/1994.	Industrial wastewater quality to be connected to the sewer system.
Irrigation Water quality Guidelines.	JVA	Indirect use of treated wastewater.
Guidelines for Reclaimed water Irrigation in the Jordan Valley.	JVA	Good agricultural practices in deal-ing with blended treated wastewater.
Guidelines for a State Crop Monitoring System for Fresh Vegetables.	JFDA	Methodology for safe sampling and analyses of fresh vegetables.
WHO Guidelines on Wastewater Use in Agriculture 2006.	WHO	Safe use of treated wastewater in ag-riculture.

AF Check List of Environmental and Social Principles

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law	Yes all WWTPs and major infrastructure projects have had a comprehensive EIA according to the EA regulation # 37 FY 2005 and an environmental and social safeguards management and monitoring plan compliant with international regulations governing the funding donor/lender agencies and Jordanian regulation. Also pls refer to section E II	All impacts and risks identified in EIA and social management plans no further action or assessment needed
Access and Equity	Free and safe access and Equity is ensured under the EIA and National EIA Regulation and environmental law #52 FY 2006 and	no further action or assessment needed
Marginalized and Vulnerable Groups	Marginalized groups must not be impacted and their concerns addressed as per the social safeguards plan ensured under the	no further action or assessment needed

	EIA and National EIA Regulation and environmental law #52 FY 2006	
Human Rights	HR are not to be violated under the (Jordanian labour law and monitored by the Jordanian Human Rights Centre)	no further action or assessment needed
Gender Equity and Women's Empowerment	Women engagement and empowerment through the labour and social laws are ensured	no further action or assessment needed
Core Labour Rights	Labour law compliance for worker safety, health and rights supervised by the national , international human rights orgs and ILO	no further action or assessment needed
Indigenous Peoples	Indigenous people must be protected	no further action or assessment needed
Involuntary Resettlement	**In any case it may happen impacted persons should be compensated and a resettlement plan is prepared** ensured under the EIA and National EIA Regulation and environmental law #52 FY 2006	**No involuntary settlement is envisaged under project** activities and no further action or assessment needed
Protection of Natural Habitats	Regulations for protection of birds and wildlife and roles covering their hunting (No. 113, 1973).	No further action or assessment needed
Conservation of Biological Diversity	Regulations for protection of birds and wildlife and roles covering their hunting (No. 113, 1973).	No further action or assessment needed
Climate Change	Third National Communication to UNFCC and the National Climate Change Policy of the Hashemite Kingdom of Jordan (2013-2020)	No further action or assessment needed
Pollution Prevention and Resource Efficiency	Ministry of Agriculture Law (No. 44, 2002). Natural Resources Authority Laws 2002.	No further action or assessment needed
Public Health	Adherence to Public Health Law (No. 54, 2002).	No further action or assessment needed
Physical and Cultural Heritage	The Antiquities Law (No. 21, 1988).	No further action or assessment needed
Lands and Soil Conservation	Ministry of Agriculture Law (No. 44, 2002).	No further action or assessment needed

How Jordan's Environmental and Social Safeguards correlate with the AF Environmental and Social Policy (ESP)

Principle 1: ***Compliance with the Law.*** Compliance with applicable domestic and international laws through adherence to the above mentioned national regulations and standards will ensure compliance with the AF ESP. The EIAs describe the legal and regulatory framework for the project activity that may require prior permission (such as planning permission, environmental permits, construction permits, permits for water extraction, emissions, and use or production or storage of harmful substances describe the baseline conditions and the plan to achieve compliance with the relevant requirement during construction and operation of any given project.

Principle 2: Access and Equity. This is guaranteed under the EIA and Environmental law, health and water law as well as under the construction, labour by laws and human rights national centre oversight to ensure fair and equitable access to benefits in a manner that is inclusive and does not impede access to basic health services, clean water and sanitation, energy, education, housing, safe and decent working conditions, and land rights. Disputes are ensured via the grievance and redress mechanism disputants equally. Furthermore, the project/programme will be designed in a way that will not impede access of any group (farmers and beduins) to the essential services and rights mentioned in the principle.

Principle 3: Marginalized and Vulnerable Groups. Before initiating the project in Wadi MOusa, USAID in cooperation with the Hashemite Fund for Badia Development funded a Socio-economic Assessment for the Wadi Mousa Wastewater Re-use Implementation Project in 2003 prepared by Mohamed Fayez Tarawneh as socio-economist. The study identified the risks associated with: tribal rights and tensions , and looked at land deeds and rights, the social structure and families, who has the most right to work at the pilot, community leaders who should manage community perceptions and alert the project team to sensitivities. The project will continue to adhere and monitor social changes and be sensitive to the marginalized and vulnerable groups such as the beduins in Wadi Mousa ann the expatriate labor force in Jordan Valley. Impacts on marginalized and vulnerable groups must be assessed and considered such that they do not experience adverse impacts from the project/programme that are disproportionate to those experienced by others.

The fact that project beneficiaries are either farmer owners in JV or members of the WUA Sad Al Ahmar in Wadi Mousa will ensure that nobody is disadvantaged and that fair and equitable treatment when it comes to profits is allocated this will be ensured through the supervision of MOPIC/PU, JVA and PTDRA..

Principle 4: ***Human Rights.*** Jordan is signatory to UN Human Rights declarations and has active NGO s and civil society programs that monitor human righs as well as international organizations doing that. The Projects by the Fund shall respect and where applicable promote international human rights and monitoring mechanisms to report to the United Nations system.

Principle 5: Gender Equity and Women's Empowerment. Projects/programmes supported by the Fund shall be designed and implemented in such a way that both women and men (a) are able to participate fully and equitably; (b) receive comparable social and economic benefits; and (c) do not suffer disproportionate adverse effects during the development process.

In response to international commitments, mainly the provisions of Article 18 of the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the Jordan National Commission for Women (JNCW) prepared the Kingdom's Fifth National

Periodic Report for subsequent submission to the CEDAW Committee was prepared with the active participation of many public institutions and non-governmental organizations, which provided the required information and data needed to prepare the report. The report depicts the achievements of the Hashemite Kingdom of Jordan in its quest to eliminate discrimination against women, as well as the efforts being

exerted to mainstream gender into the process of activating constitutional and legal rights in the framework of implementing CEDAW articles and the progress achieved during the period from July 2005 (when the Combined Third and Fourth reports were submitted) until November 2009 in the economic, social, cultural political and civil rights areas, through a review of the CEDAW articles one by one in order to assess the achievements made for women in all the CEDAW domains, supported by some indicators. A preliminary version of the present report was studied and refined by all the official and non-governmental organizations' commissions during several workshops addressing all the Convention's articles before it was adopted in its final form. When Jordan ratified the Convention on 1/7/1992, it entered a reservation to Article 9/2, which stipulates that «States Parties shall grant women equal rights with men with respect to the nationality of their children», as well as Article 15/4, relating to «the movement of persons and the freedom to choose their residence and domicile», and paragraphs c, d and g of Article 16, related, respectively to «the same rights and responsibilities during marriage and at its dissolution»; «the same rights and responsibilities as parents, irrespective of their marital status; and «the same personal rights as husband and wife.»

The following should be considered in the project implementation:

- The concept of gender mainstreaming for better understanding by the water sector employees. Males and females alike.
- Women dimension should be mainstreamed from the beginning of the first phase of needs assessment, plans, project identification, monitoring as well as the evaluation process, to ensure that objectives have been adopted and equally reflected in increasing women productivity as well as enabling them to control and access resources and benefits.
- Women's direct participation and consultation should be insured within the process of identifying needs and opportunities as good governance programs require.
- Female employees should design objectives of the projects hand in hand with male employees to guarantee gender mainstreaming and creating "change**"** in the mentalities and attitudes, as a goal to achieve positive impact on female and male employee performance related to water management in the field.
- Efforts should be directed towards the exploration of restrictions that hinder women playing an active role in water management, as well as ensuring feasible improvements in the implementation systems which need specific training skills and techniques.
- Such awareness will supposedly increase the chances for female employees to possess higher positions, since their percentage in this level is low and does not exceed 10%. Such actions will hopefully have positive impacts in better managing and controlling activities on various local levels.
- Women who are unable to take decisions within their families are vulnerable to being discriminated against regarding training and promotion opportunities.

Principle 6: ***Core Labour Rights.*** The project supported by the Fund willl meet the core labour standards as identified by the International Labour Organization.
Jordan and ILO: Since joining the ILO in 1956, Jordan has ratified 24 Conventions including seven out of

eight fundamental Conventions. The ILO launched its first **Decent Work Country Programme in the Arab region in Jordan in 2006.** Since the completion of the first Jordan Decent Work Country Programme (2006-2009), Jordan was selected as one of nine countries globally, and the only country in the Arab region, to pilot the Global Jobs Pact that was adopted by the International Labour Conference in June 2009. The Global Jobs Pact contains a portfolio of policies to promote jobs and protect people, based on the Decent Work agenda. The Jordan Decent Work Country Programme 2012-2015 seeks "to support national initiatives aimed at reducing decent work deficits and strengthening national capacity to mainstream decent work in social and economic policies."

The ILO's three priorities in Jordan are:

- To expand decent work opportunities for young Jordanian men and women through the promotion of better working conditions, non-discrimination and equal rights at work.
- To extend a minimum level of social security to the most vulnerable groups of society through the Social Protection Floor as part of a more comprehensive social security system in Jordan.
- To enhance employment opportunities with a focus on youth employment.

To achieve these objectives, the ILO is working with the Government of Jordan, workers and employers to advance the national employment agenda and enhance access to decent work opportunities. It represents the common commitment of the ILO and its partners to collaborate on specific objectives in the areas of employment promotion, rights at work, social protection, social dialogue, pay equity, youth employment, labour inspection, child labour among others.

Workers' Rights Jordanian law prohibits most workers from working more than the customary 48 hours a week, and 54 hours for hotel, restaurant and cinema employees. Employees are entitled to one day off each week, and workers may not work more than 16 hours in any continuous period or more than 60 hours' overtime per month

Workers in the private sector and in some state-owned companies have the right to establish and join unions, although unions must be registered to be considered legal. Over 30 percent of the work force is organized into seventeen unions, which comprise the General Federation of Jordanian Trade Unions. The Constitution prohibits anti-union discrimination, and unions exercise their right to bargain collectively. Labor disputes are usually resolved through mediation or arbitration, and during this time strikes are prohibited. If a settlement cannot be reached through mediation, the Ministry of Labor may refer the dispute to an industrial tribunal by the agreement of both parties. If only one party agrees, the Ministry of Labor refers the dispute to the cabinet and then to Parliament. Labor law prohibits employers from dismissing a worker during a labor dispute.

Children's Rights The government is committed to ensuring the rights of children. Education is free for all primary and secondary school students and compulsory until age 15, and corporal punishment in schools is prohibited. Jordanian labor laws prohibit children under the age of 16 from working except as apprentices, who at age 13 may begin part-time training for up to six hours per day. Poverty has contributed to the problem of child street peddlers, and the Ministry of Social Development has formed a committee to address the problem. In most cases, the children are removed from the streets, returned to their families or to juvenile centers, and their families are sometimes provided with a monthly stipend

Women's Rights Jordan's constitution protects women by explicitly stating that all Jordanians are equal before the law, have the right to assume public office and the right to work. In 1974, women were given the right to vote and the right to run in general elections.
In September 1996, a National Committee for Women was formed in order to formulate general policies related to women in all fields. The committee also defines the priorities, charts plans and programs for women in both the governmental and non-governmental sectors.
In June 1996, working mothers were provided with additional legal protection. The new labor law that went into effect includes an article that prohibits employers from terminating their jobs or giving them notice about termination if they are past their sixth month of pregnancy or on maternity leave. It also gives mothers ten weeks of paid maternity leave, compared with the previous allowance of eight weeks, as well as an hour a day for breast-feeding during the first year after delivery and a year's unpaid leave to care for their newborns.

Principle 7: *Indigenous Peoples.* *The Fund shall not support projects/programmes that are inconsistent with the rights and responsibilities set forth in the UN Declaration on the Rights of Indigenous Peoples and other applicable international instruments relating to indigenous peoples.*

This is protected under the National Tribal Law of Jordan The United Nations Development Fund for Women (UNIFEM) indicated that tribal law in Jordan was abolished in 1975 (UN 2006, 17) **where as** far as the role of the state is concerned it should be noted that Jordan tends to respect tribal law and customs and allows much autonomy to its tribes in conducting their own internal affairs. In fact, the Jordanian legal system informally recognises the existence of tribal law side by side with civil law. For instance, a conflict between two families would be dealt with in court but at the same time the families would try to solve their case through tribal processes of conflict resolution (temporary truce, mediation, arbitration, compensation, reconciliation, etc.).

Principle 8: *Involuntary Resettlement.* *Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids or minimizes the need for involuntary*

resettlement. When limited involuntary resettlement is unavoidable, due process should be observed so that displaced persons shall be informed of their rights, consulted on their options, and offered technically, economically, and socially feasible resettlement alternatives or fair and adequate compensation.

No involuntary resettlement is to take place under this project or sub projects

Principle 9: *Protection of Natural Habitats.* *The Fund shall not support projects/programmes that would involve unjustified conversion or degradation of critical natural habitats, including those that are (a) legally protected; (b) officially proposed for protection; (c) recognized by authoritative sources for their high conservation value, including as critical habitat; or (d) recognized as protected by traditional or indigenous local communities.*

Jordan is signatory to the main international charters dealing with bio-diversity and conventions such as convention on international trading in the wildlife animals and plants that are threatened with
extinction (cites) that was adopted in Washington on 3.3.1973, and the biological diversity convention that was adopted in the city of Rio De Janiro on 5.6.1992, and the convention relating to
wet lands (which is of an international significance) in its capacity as the habitat of water birds (Ramsar) that was adopted in the city of Ramsar on 2.21971, and the Carthage Protocol for restorative safety that was adopted on 29.1.2000. A listof international agreements in which Jordan is signatory to was presented in section Part II **K**

Principle 10: *Conservation of Biological Diversity.* *Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids any significant or unjustified reduction or loss of biological diversity or the introduction of known invasive species.*

The Royal Society for The Conservation of Nature (RSCN) is an independent voluntary organization that is devoted to the conservation of Jordan's natural resources; it was established in 1966 under the patronage of Her Majesty Queen Noor with the late King Hussein as Honorary President.

RSCN has the mission of protecting and managing the natural resources of Jordan, for it is responsible for protecting wildlife and wild places and is one of the few voluntary organizations in the Middle East with such a public service mandate.
The organization's principal activities include:

- Setting up protected areas to safeguard the best wildlife and scenic areas
- Breeding endangered species to save them from extinction.
- Enforcing governmental laws to protect wildlife, control illegal hunting
- Raise awareness in environmental issues through educational programs.

- Socio-economic development of rural communities.
- Promoting the sustainable use of natural resources.

Principle 11: *Climate Change*. *Projects/programmes supported by the Fund shall not result in any significant or unjustified increase in greenhouse gas emissions or other drivers of climate change.*

Jordan has a " National Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020" This policy has been developed with a dual objective in mind. The first was to strengthen Jordan's capacity to respond to the detrimental impacts of Climate Change expected to add a multiplying effect to current challenges in sectors like water and agriculture. The second was to strengthen Jordan's global stewardship in addressing options to reduce emissions while achieving sound and sustainable developmental objectives especially in the various sectors of energy. Reaching a national consensus on this policy has not been easy, and that is a positive factor by itself. Extensive debates and exchanges of ideas are always an indicator of seriousness of participating parties to have the best possible outcomes. A policy document on Climate Change should encompass national sectoral priorities packaged in a way that is integrated with the national and global responsibilities to contribute to addressing Climate Change threats at all levels, specially adaptation and mitigation.

During the consultation process for this policy, all national stakeholders were engaged in a healthy discussion that reflected the importance of the topic and the need to optimize the policy document to a level that guarantees maximizing Jordan's role in the global fight against Climate Change and providing best conditions for gaining opportunities for enhancing Jordan's technical, human and institutional capacities to adapt to Climate Change impact. Jordan is a mere contributor to the global GHG emissions with only a marginal emission rate of 0.01% of total global emissions.

However, committed to its role and reputation as a global pioneer in the implementation of the various UN conventions, Jordan believes it has a major responsibility in addressing Climate Change challenges while adhering to its national priorities and developmental objectives. The outcomes of the UNFCCC negotiations in the future will probably put more responsibilities on the shoulders of developing countries and we want to make sure that Jordan is prepared for the new phase with a clear plan. Being a pioneer is not new to Jordan as it was the first Non-Annex I country to produce an Initial National Communication back in 1997 and has been an active member in almost all Climate Change and other UN Conventions' global treaties, partnerships and programmes.

Principle 12: *Pollution Prevention and Resource Efficiency*. *Projects/programmes supported*

by the Fund shall be designed and implemented in a way that meets applicable international standards for maximizing energy efficiency and minimizing material resource use, the production of wastes, and the release of pollutants

Covered under the Jordan Environmental Law # 52 for 2006 and the Natural Resources Authority Law 2002 Ministry of Agriculture Law (No. 44, 2002).

Principle 13: ***Public Health.*** *Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids potentially significant negative impacts on public health.*

Public health protection is assured under the Public Health Law (No. 54, 2002). According to the new Public Health Law No.54, issued by a Royal decree in 2002, the Ministry of Health is responsible for all health matters in the Kingdom, and in particular:

- Protecting health through providing preventive and curative services as well as
- monitoring responsibilities
- Organizing and supervising health services provided by the public and private sectors
- Providing health insurance for citizens within available resources
- Establishing educational and training health institutions managed by the MOH

Article 4 of the Law defines areas of work for the Ministry including health promotion and healthy lifestyles, disease control, prevention of nutritional deficiencies, maternal and child health, school health, health of the elderly and prevention and control of no communicable diseases. The Law contains provisions on the practice of medical and health professions, private heath care institutions, mental health and drug addiction, communicable diseases, immunization, pharmaceuticals, water and sanitation

Principle 14: ***Physical and Cultural Heritage.*** *Projects/programmes supported by the Fund shall be designed and implemented in a way that avoids the alteration, damage, or removal of any physical cultural resources, cultural sites, and sites with unique natural values recognized as such at the community, national or international level. Projects/programmes should also not permanently interfere with existing access and use of such physical and cultural resources.* The Antiquities Law (No. 21, 1988

Jordan cultural Heritage is divided into Antiquities (Any object, whether movable or immovable ,which has been constructed, shaped , inscribed, erected, excavated, or otherwise produced or modified by humankind earlier than the year 1750 A.D) , which is protected by the Antiquity Law No. 21 for the year 1988 and its amendment . Recently on 2003, Interim Law No. (49) For the Protection of Urban and Architectural Heritage was approved. The law deals with heritage sites constructed after the year 1750 for its importance either with regards to the structural technique, or its relation to a historically important personality, or its relationship to important national or religious events. A new directorate was created at the Ministry of Tourism and Antiquities to implement this law

Principle 15: ***Lands and Soil Conservation.*** *Projects/programmes supported by the Fund shall be designed and implemented in a way that promotes soil conservation and avoids degradation or conversion of productive lands or land that provides valuable ecosystem services.*

Ministry of Agriculture Law (No. 44, 2002) ensures conservation of land and soils coupled with the provisions under the environmental protection law 52 FY 2006

Summary and Conclusion:

All subprojects submitted under this proposal would have qualified for Category B under the AF regulations , however since they have had an EIA and EMMP under national regulations which also complied with international funding agencies that funded the construction of the WWTPs and their reuse pilots, we feel that from the scrutiny of the EMMPs and full adherence to the AF ESP and EIAs conducted in Jordan would ensure no violation of both requirements. As for the FIFA Mazzarah rain water harvesting activity it still would be under Category B depending on the design and feasibility studies to be conducted with full implementation of the EIA and EMMP in harmony with AF ESP and would cost around $40,000 to conduct the scoping session, baseline measurements, EIA with social and EMMP .

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

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

At the l national level, the Project will be supported by a **National Steering Committee (NSC).** The NSC will be formed to oversee, monitor and keep abreast of project progress and facilitate the implementation of the project in partnership with co-financing institutions. Direct implementation of the project and decisions regarding the allocation of resources and assistance under the project will be taken by MOPIC as the executing agency under the overall direction of

the NSC, in consultation and partnership with the Government of Jordan. The NSC will be chaired by MOPIC and include Secretary Generals from the Ministry of Environment, Ministry of Agriculture, Jordan Valley Authority , Ministry of Water and Irrigation, and Director Generals Department of Statistics, the Jordan Food and Drug Administration (JFDA), Department of Meteorology, and the Commissioner of the Petra Tourism Development Regional Authority (PDTRA). The Directors of Enhanced Social & Economic productivity Program (EPP) in MOPIC is also part of the NSC assigned as non-voting technical support members.

Since the proposed project emphasizes major goals of the Enhanced **Social & Economic Productivity Program (EPP) at MOPIC with objectives** 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.

EPP has the accessibility to the most vulnerable people through 32 poverty pockets that were updated recently in 2012 and designs programs to alleviate poverty in such regions. EPP 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. EPP 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 EPP set the general policy of EPP, provides strategic guidance and oversight for the unit, advice on corrective measures, provide conflict resolution. So, EPP has the necessary autonomously for optimal coordination, management and sustainability of its programs.

Moreover, EPP meets the criteria necessary to house the proposed Program Management Unit (PMU). The Government of Jordan’s commitment to EPP, 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 EPP will be closely monitored, and EPP will establish the PMU and process essential procurement contracts prior to project effectiveness.

The project Implementation Arrangement:

The PMU will be tasked with the Project Implementation to coordinate the activities of all project executing agencies/entities. 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 NSC and chair the project‟s Technical Working Group (TWG)

The PMU, will be staffed by the Project Team headed by a Project Manager; Monitoring and Evaluation (M&E), Training, procurement and Financial Management Specialists; and Administrative Assistant.

The **Project Team (PT)** will consist of the following core staff:

- 1 National Project Manager chairing the PMU whose mandate will be to provide technical guidance , liaison with the donor lenders, sub components coordination and oversight of administrative, financial and M&E activities
- 1 Monitoring and Evaluation Officer (responsible for tracking of results indicators)
- 1 Financial and Procurement Assistant;
- 1 Administrative /Data Management Assistant;
- Technical Sector Specialists (agriculture, water/irrigation engineer, livestock, agro-economist, soil conservation and rainwater harvesting) whose services will be contracted as needed.

The PMU will coordinate the project activities and ensure preparation of annual work plans and budgets; it will also ensure collaboration between stakeholders and collect M&E reports from sub components to conduct M&E and include in overall project reporting. The establishment of M&E systems for relevant outputs/activities is of paramount importance for effective knowledge management and sharing. Based on MOPIC's experience from community-based adaptation projects, presentation of concrete/tangible benefits (in terms of, for example, increased available quantities of water though wastewater reuse , increased farmer income, reduced harvest losses) in a way that is easy to understand by community members is often one of the most effective means for upscaling and replication.

It is noted here that investing in a robust and systematic M&E framework at the beginning of the project has a significant efficiency and effectiveness gain in the knowledge management within the project. Using M&E tools, and training the assigned M&E focal points at each sub component throughout execution of the project, will ensure that project activities are well coordinated and monitored and that lessons learned will be captured, codified and discussed among stakeholders. **This M&E framework** will enable a production of technical reports from each of the technical Outputs, which will be collated as "best practice guidance materials and tools". Periodic project briefs, annual progress reports, midterm evaluation and final evaluation results will be circulated widely for review.

Execution Arrangements: Project components will be executed by the following

government and NGO entities as follows:

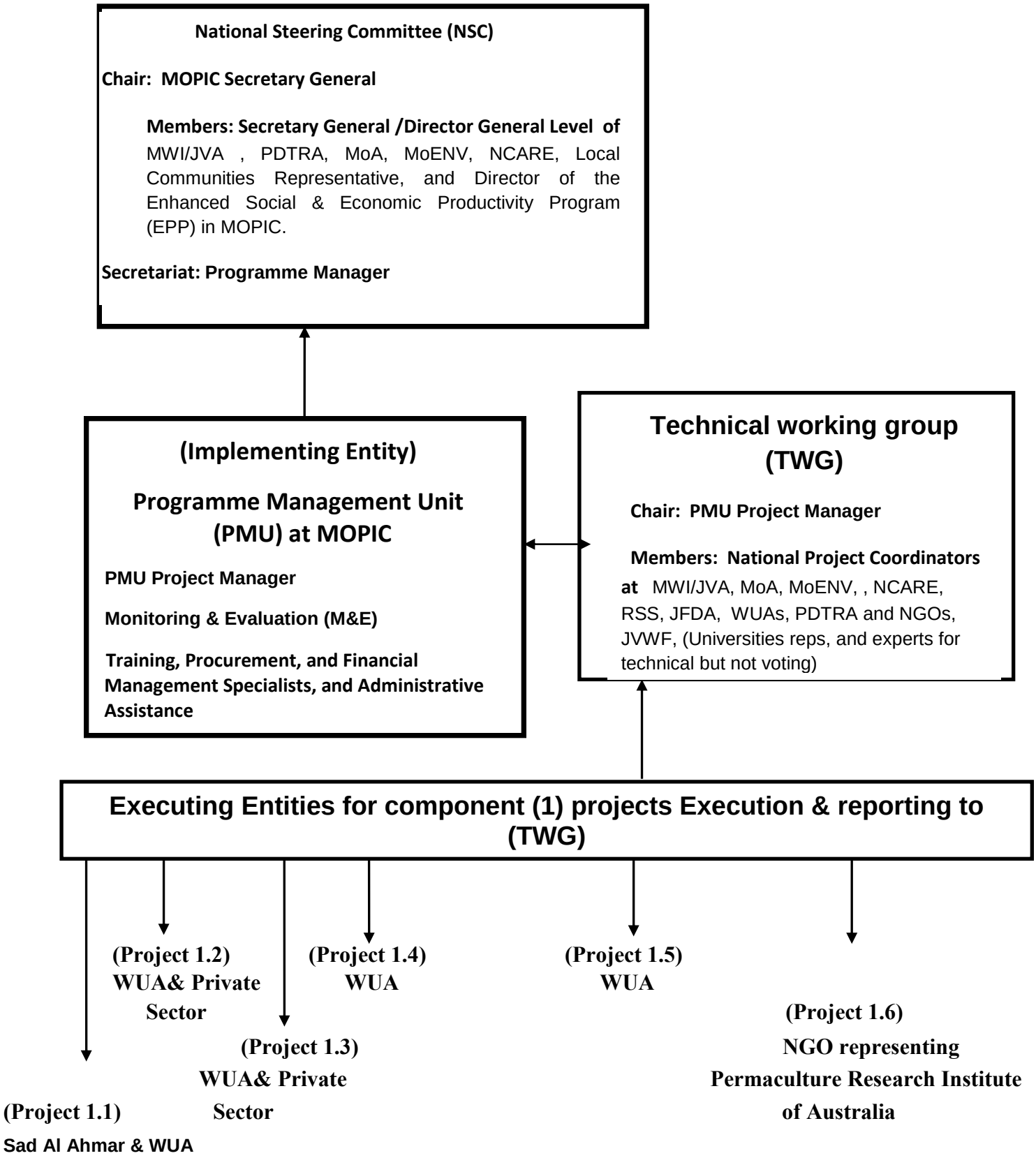
- Component I will be executed by PDTRA as owner of Wadi Mousa land, JVA /MoA, , DOS, WUAs and Al Hussein Bin Talal University.
- Component II will be executed by MoENV, MWI, MoA/NCARE, JFDA, and RSS, and Department of Meteorology.

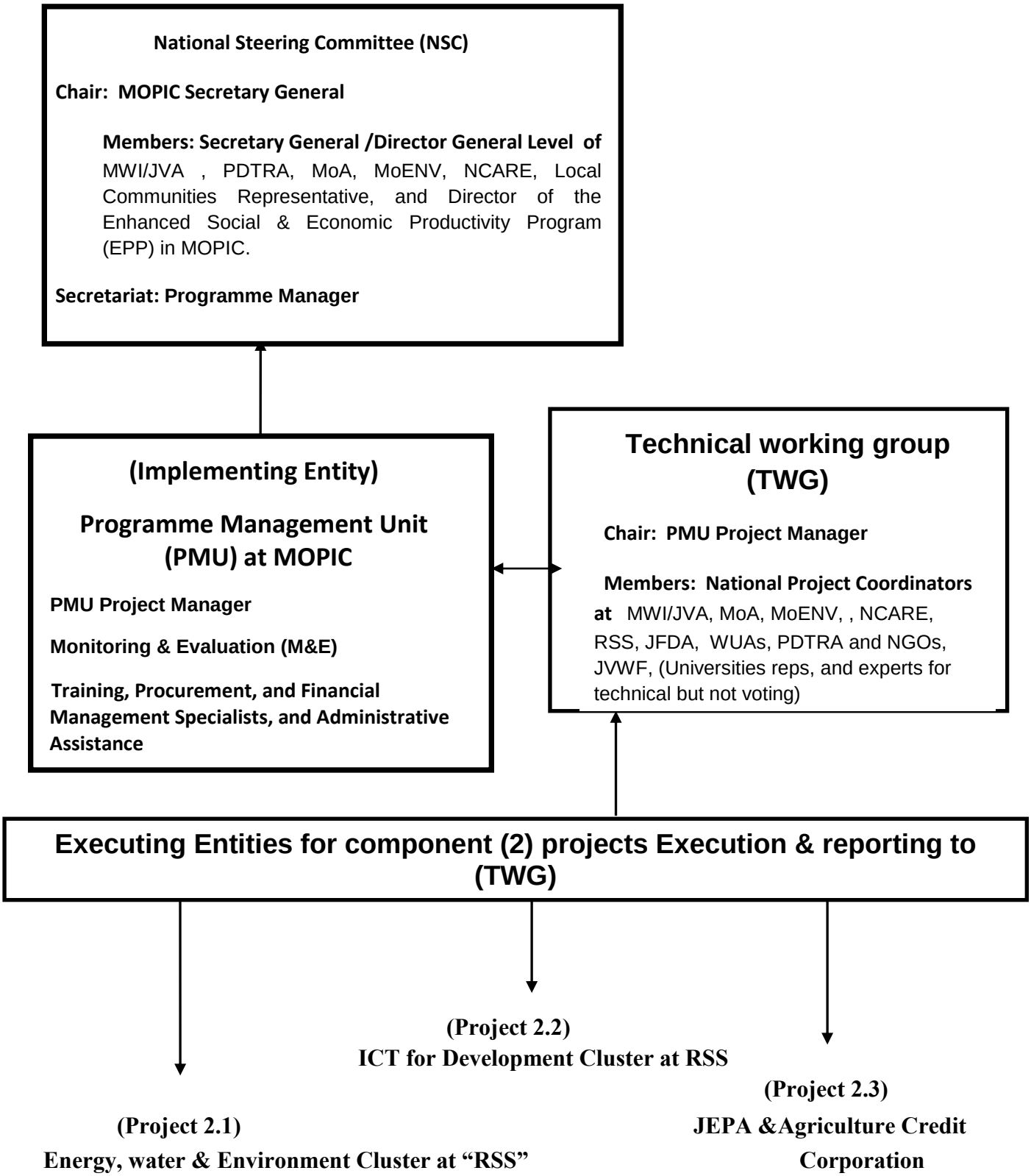
At the field sub component execution level Field Satellite Management Units (FSMU) will include partners from the relevant organizations, ministries, research institutions, NGOs etc. Each FSMU entity will manage & execute the project according to its mandate, role and professional expertise. These institutions will *include but not limited to (The 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 Petra Tourism Development Region Authority (PDTRA) and Water Research and Environment Centers at local universities as the source for technical consultancies (Jordan University for Science and Technology in Irbid for the northern JV support and Al Balqa Applied University for the Middle and Karamh Ghours and Al Hussein Bin Talal University in Maan for Wadi Mousa Project support while the University of Jordan can provide support to the Mazzrah Haditha Ghours. The Department of Statistics, Department of Meteorology and Jordan Institute for Standards and Metrology will also be involved*

Technical Working Group (TWG): the Project Manager will chair the Technical Working *Group with focal points from MoA, MoENV, MWI, NCARE, JVA, WUAs, PDTRA, RSS, JSMO, and Dept of Meteorology.* Local and international experts will be hired as consultants with expertise in relevant fields as and when needed.).

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. The two diagrams below illustrate the execution arrangements and coordination for all projects under components 1 and 2.

Project Steering (Implementation Oversight) Structure





Following is some information on the executing entities:

Ministry of Agriculture (MOA):

The ministry works on the organization and development of the agricultural sector in order to produce a sophisticated agricultural and growing, diversified and integrated preserves the environment, natural resources and promotes sustainability of resource use in and self-reliance in food production in line with the requirements of the local and regional markets.

The ministry aims to increase the production of food and agricultural products, create the right climate for investment in the agricultural sector, increase farmers incomes and improve their standard of living and improve the efficiency of irrigation water use at the farm level.

The Ministry of Water and Irrigation:

Ministry of Water and Irrigation (MWI) is the official body responsible for the overall monitoring of the water sector, water supply and wastewater system and the related projects, planning and management, the formulation of national water strategies and policies, research and development, information systems and procurement of financial resources. Its role also includes the provision of centralized water-related data, standardization and consolidation of data.
The MWI main goal is to maintain sustainable water resources to achieve the national water security and to serve the overall development objectives.

The Ministry of Water and Irrigation embraces the two most important entities dealing with water in Jordan: The Water Authority of Jordan (WAJ): in charge of water & sewage systems. The Jordan Valley Authority (JVA): responsible for the socio-economic development of the Jordan Rift Valley, including water development and distribution of irrigation.

This relative position with respect to WAJ & JVA reinforces MWI's leading role as Jordan's lead entity on water issues. With its extensive Water Information System1, MWI has become a leader in the region that uses GIS-based digital tools for Water Master Planning activities, offering the framework, databases and tools necessary to manage water data and providing water specialists with data and information for water sector monitoring, management and planning. MWI regularly produces essential water sector information products including the Water Master Plan.

Jordan Valley Authority (JVA):

JVA carries out integrated socioeconomic development of the Jordan Valley area which extends from the Northern border of the Hashemite Kingdom of Jordan in the North to the Northern tip of the Dead Sea in the South; the Jordan River to the west.
JVAs mission is to develop and protect water sources for exploitation in all fields, Improve and develop the Jordan valley economically, agriculturally and socially, provide appropriate climate for

investments and preserve the environment in the Jordan valley.

Moreover JVA Institutional goals is to sustain and increase traditional sources of water, improve and increase the efficiency of irrigation systems in the Jordan valley, effective storage of surface water, increase the sources of non-conventional water, utilize the treated water in industrial and agricultural fields, protect water sources from pollution and depletion and protect the soil from degradation.

Functions of the Jordan Valley Authority

- The duties of the Jordan Valley Authority includes the following: Develop the water resources and exploit them in the irrigated agriculture, domestic use, municipal and industrial affairs, electricity generation and other useful purposes as well as protect and preserve these resources and do all the required work to develop them. Also conduct the necessary studies to assess water resources, including hydrological and hydrogeological studies, Geological survey, drilling optional wells, building monitoring stations.
- Study, design, implement, operate and do the maintenance of irrigation projects and the projects' facilities and business. Survey, classify and identify the lands appropriate for irrigated agriculture and reclaim and divide these lands into farm units. Settle all the disputes arising from the use of water resources. Organize and direct the establishment of private and public wells. Develop the environment in the valley, and protect, improve and implement all actions necessary to this end.

Ministry of Environment (MOE):

The role of the Ministry of Environment is to contribute to the achievement of sustainable development: through implementation of policies, mechanisms and appropriate operational tools that appear and strengthen the links between environmental protection and economic prosperity and contribute to the integration of environmental concepts into national development plans.

The Ministry of Environment is also responsible for development of policy and legislation and strengthening supervision and inspection and application of legislation and most importantly, promote education and awareness through disseminating environmental education and raising public awareness in the field of environmental protection.

- **Petra Development and Tourism Region Authority (PDTRA)- Jordan**

URL: http://www.pdtra.gov.jo

Petra development tourism Region Authority is a legal, financial and administrative independent Authority, founded in 2009 and aims to develop the region touristy, economically, socially, culturally, and contribute to local community development. It goals are

Disaster Reduction Goal

Enhanced capacity of government and Civil Society organizations (CSOs) to prevent, respond to and mitigate natural and man-made disasters.

Policies and Programmes in DRR

- Enhancing Institutional Capacities to reduce Disaster Risk and to integrate Climate Change in the region which includes:
  1-Integrated Risk Assessment
  2-Setting up an Early Warning System for Flash Floods
  3-Petra Neighborhood Disaster Volunteers
  4-Making Petra Resilient City. Petra Is getting reading

Making disaster risk reduction a policy priority, institutional strengthening

- Integrated Risk assessment for Wadi Mousa City in Petra

Risk assessment and early warning systems

- Setting-up an Early Warning System for Flash Flood

Other activities

- Petra Neighborhood Disaster Volunteers

Making Cities Resilient Campaign Activities

- 1-Integrated Risk Assessment project is being implemented in Petra nowadays (Nov 2012-July 2013)
  2-Setting-up an Early Warning System for Flash Floods is being implemented in Petra nowadays (Jan-Sept 2013)
  3-Disaster Risk Reduction Unit has been established in PDTRA - Directorate of Strategic Planning & Research

The National Center for Agricultural Research and Extension (NCARE):

The National Center for Agricultural Research and Extension (NCARE) is a leading center for research & extension in Jordan; it houses most agricultural research, projects and extension activities. NCARE is the supportive pillar for agricultural sector to achieve sustainability and protect the environment.

NCARE serve as reference center for developing, conducting applied agricultural research and disseminate the results in order to achieve comprehensive and sustainable agricultural development through optimal use of the available natural resources and preserve environment.

NCARE has also an important role in Watershed Management and Water Harvesting through the Determination and adaptation of different techniques of water harvesting suited to the agro climatic conditions in Jordan. The activities of Water Management and Environmental Research Program are related to: irrigated agriculture, optimum use of water resources, and management of natural resources in rainfed areas, marginal and desert regions.

The Royal Scientific Society (RSS):

RSS is a non-governmental organization involved primarily in R&D related to the development process in Jordan. RSS operates on not-for-profit basis and enjoys financial and administrative independence.

RSS is the premiere research organization in Jordan, boasting a proven track record of services to the local industry. It plays a substantive role in the development of the local economy and technology base. It specializes in mechanical engineering, electronics, environmental research, building research, IT, and chemical research. It includes a university at which computer science and engineering are taught.

RSS works diligently towards maintaining its technological leading role in the country through acquiring national and international accreditation for its laboratories, working jointly with leading international entrepreneurs, facilitating up-to-date IT infrastructure and links for its staff and securing advanced specialized training for its employees.

RSS being customer–centric simply means having an unwavering commitment to the people of Jordan. The RSS continuously strives to improve its standing as a point of reference for scientific knowledge and technical awareness, where quality standards and public health become equal and totally uncompromised. RSS is unequivocally committed to testing with guaranteed accuracy, and is dedicated to research and development. The Outreach Sector at RSS includes a diverse set of programmes that work closely with the local community to address different issues.
RSS realizes its goals through the following specialized centers:

- Computer Technology, Training and Industrial Studies
- Electronic Services and Training
- Mechanical Design and Technology
- Building Research
- Industrial Chemistry
- Environmental Research

Jordan Food & Drug Administration

Jordan Food and Drug Administration (JFDA) have been created in 2003 as the sole national competent authority for drug safety & efficacy and food safety and quality.

Objective:

· JFDA is an independent public sector regulatory institution whose main objectives are to ensure that:-

- Food is safe, wholesome, and properly labeled.
- Drugs are safe and efficacious.
- Safety of all products explicitly stated in the enforced drug and pharmacy law.

Tasks and Duties:

- Supervision and inspection of the quality and suitability of food stuffs in accordance with technical rules, specifications and standards stipulated in the legislations in force.
- To achieve the requirements and take measures in connection with drug and pharmacy law, also to guarantee and supervise the safety and quality of medication in accordance with the rules and standards specified in the legislations in effect.
- To exercise any other supervision and inspection in connection with food stuffs and drug specified in the Food Law and Drug and Pharmacy Law in effect.

Jordan Standards and Metrology Organization (JSMO):

JSMO is pioneer and distinguished Organization nationally, regionally, and internationally in the fields of standardization and quality infrastructure.

One of their main aims is to Practice an initiative and effective role in protecting human's health, safety, and rights as well as the environment. Furthermore, enhancing confidence in the services and products placed in the market, through developing and implementing systems that are compatible with best international practices in the fields of standardization, metrology, conformity assessment, market surveillance, accreditation and knowledge management, in cooperation with stakeholders and through providing a supportive environment.

Organizational Objectives:

1. Ensuring the compliance of products placed in the market to technical regulations and other related mandatory requirements, In order to protect human's health, safety and rights.
2. Providing high quality services and products, in order to enhance the confidence in national products and services.
3. Increasing the effectiveness of resources management to achieve the sustainability and development of JSMO's activities.
4. Contributing in improving the environment in Jordan.

Objectives

- Adoption of a national system for standardization and metrology based on accepted international practices.

- Keeping pace with scientific and technical developments in the fields of standards, metrology, conformity
- Ensuring the health and safety of the Kingdom's citizenry and protection of the environment by making sure that products are in compliance with the technical regulations adopted by the Organization for the purpose. Assessment and laboratory accreditation.

Jordan Meteorological Department

Mission: Raising the quality of local products through the adoption of appropriate Jordanian Standards in order to enhance their competitiveness in the local and international markets and thus support the national economy. The Department was established in 1951 as part of the Civil Aviation Authority. In 1967 it became an independent entity attached to the Ministry of Transport. The Department operates 31 Stations: 11 Synoptic, 9 Climate, 10 Agro meteorological Stations and 1 Radiosond Station. The Department now functions in many everyday aspects of citizens' life, where its role is no longer limited to issuing a weather forecast, but also provides various services in the fields of aviation, agriculture, climate and constructions. The Meteorological department is responsible for sustaining and building the climatic register by widening the net of weather stations for the observation of the elements of the atmosphere and archiving the data in digital format- climate database leading to presentation of the service for users with suitable time speed for analysis, research and sustainable deployment.

Its activities include:

- Install and maintain national observation network.
- Contribute in national development program by providing specialized data informal.
- Deploy the National Climate Registry.
- Contribute to relevant external activities.

Coordination Arrangements for Sub-Projects execution and Supervision

The PMU project team will coordinate with (either PDTRA or JVA) and the with technical managers of Components 1 and 2 to guide the sub project teams on the extent of cooperation needed by (the execution entity for each sub project) The subproject manager will work closely with the assigned Technical working group members. will to appoint a senior and two assistant engineers as a point of contact for the farmers and WUA when the farmers need assistance in managing the pilot.

Execution and Coordination Aactivities of the components 1 and 2 managers:

- Work with the WUA on all aspects of pilot project management through setting up of a ***satellite field project management office***.

- Support the rrepresentatives of 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 on the relevant WWTP effluent water quality with the relevant water company in charge of the WWTP 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.
- Assist the WUA in managing the revolving fund once it is established.
- Ensure that sub project managers keep propoer records on production, water usage, machinery O&M, water quality, machinery operations.
- Continue mentoring the WUAs to build their capacity and to be able to manage all above aspects on their own in the future.
- To coordinate with JVA or Petra Tourism Development Regional Authority (PDTRA) as and where needed.
- JVA will manage and supervise the execution and operation of the activities in JV while PTDRA will manage those in Wadi Mousa
- Emphasize on the key theme and 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.
- Emphasize 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 local 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. GIS and Remote Sensing tools will be used in planning and along the duration of the project.
- Also as monitoring and evaluation component is needed for monitoring project activities during the project duration each sub project will assign an M&E person to collect need data

B. Describe the measures for financial and project / programme risk management.

The GoJ has shown resilience and adaptive capacity to Climate Change through the initiation of mega projects such as the Disi Water Conveyance System, rehabilitation of springs and wells, construction of modular water and wastewater treatment plants all of which were in an attempt to narrow the gap between supply and the increasing and competing demands for water while suffering over the past two year from the influx of Syrian refugees to Jordan.

Donor lender agencies have also shown strong support and commitment towards assisting Jordan deal with the demand for water and other natural resources that is increasing by the day. Jordan thus views this project as an opportunity to implement a national climate change adaptation program through the initiation of pilot programs in support of the agriculture sector that are coupled with community based initiatives. There are however risks associated with the implementation of the project some of which are of political nature due to the prevailing regional turmoil and Arab Spring, institutional related to the weak climate change policies and need for capacity building, and technical nature related to the need to demonstrate climate change adaptation measures via pilots at all levels of the society

These risks have been taken into account in the project design, with a view to minimizing or mitigating them. Based on the overall assessment, this project can be classified as being of a “moderate” risk category.

During the project preparation/design and formulation phase, key risks underlying the project were analyzed and qualitatively assessed in connection with the context of the planned outcomes and target demonstration/pilot sites for the project. MOPIC as the key executing agency will be responsible for overall project oversight while, MWI and MOA are responsible towards addressing and mitigating the project risks I relation to water and agricultural sectors respectively while MOE would ensure that that the implemented measures correlate with the work in progress for the preparation of the Third National Communication,

MOPIC will be the ultimate responsible entity with regards to all financial risks, coordination oversight and the right of cessation of activities, or withdrawal of funding in the event of risks that cannot be otherwise managed.

Potential risks with an assessment of the degree of each risk, and the mitigation measures

identified to mitigate are presented in the table below:

Potential Risks and Mitigation measures

No	Risk	Classification	Measures for Addressing Risk
1	Weak interaction and response of local communities and institutions to CC interventions,	Moderate	Embedding effective capacity building and training measures in the component 2, to ensure effectiveness and sustainability at the all levels
2	Delays in programme implementation, and continued stress and competing demands on infrastructure interventions	Moderate	GOJ line ministries and MWI PMU continuously carry out design and feasibility studies in support of infrastructure implementation
3	Delays in Completion of data and information gathering	Low	Surveys and community participation and engagement has already taken place via poverty pockets surveys, design and feasibility studies, Jordan Valley water Forum Field visits and stakeholder gatherings have already taken place
4	Weak incentives for stakeholders, farmers and local communities to cooperate due to time lag for fruition of results, , may reduce stakeholder engagement and participation	Moderate	Pilot activities will yield immediate benefits for Communities in terms socio economic livelihoods and community enhancements, awareness. preparedness, skill development and income generation activities. This will be emphasized during inception phase.
5	Recruitment	Low	High level coordination

	Delays may affect initiation of project activities		will be established by MOPIC at inception phase. Position descriptions and staff TORs for project will be prepared upon AF Board project endorsement
6	Potential for unsatisfactory performance of government and Non government agencies implementing project components	low	Line participating ministries and NGOs competencies, are known through the Second national Communication. Expert technical support through he project would limit this risk
7	Required coordination with National and donor/lender funded ongoing projects fails	Low	Under the MDGs Jordan and donors are coordinating and harmonizing projects for alignment with national developmental plans. As executing agency MOIC will have a strong hold the coordination mechanism through the Project management Unit and through its role for the donor lender coordination and funds mainstreaming and national planning coordination.
8	Cabinet changes and reshuffles in the government may impact project thrust and momentum,	Moderate	PMU must keep line ministers and agency heads of project progress and developments
9	Regional Political instability may impact implementation or cause delay.	Moderate	The GOJ institutional and financial systems have shown admirable resilience to various political stalemates; however the risks exist and will be monitored.

Over the course of the project, a Program Management Unit (PMU) which will implement the role of National Steering Committee (NSC) will monitor the risks outlined above and identify risks rating. Issues/Risks will be raised to NSC where these risks will be discussed and mitigation measures identified for Implementation. The current strong political commitment of national and local implementation partners is evident which will limit risks from materializing.

The Table Below assigns risks per component output based on the indicators, baselines & targets with sources of verification:

Output	Indicator(s)	Baseline	Target	Source of Verification	Risks & Assumptions
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.*					
Outcome 1: 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.	94% of treated wastewater recycled for reuse currently at 118 MCM for FY 2012	97% of of treated wastewater recycled for reuse projected at 150 MCM for FY 2015	• MDG Report FY 2010 • MWI annual report FY 2017	Delays in programme implementation, and particularly in the development of infrastructure intervention. Recruitment Delays may affect initiation of project activities Potential for unsatisfactory performance of government and Non government agencies implementing project components Delays in Completion of data and information gathering
Output 1.1,1.2: Securing high quality treated wastewater for irrigation purposes in Wadi Musa & in Northern Jordan Valley	Quantity (m^3) of treated wastewater reused for irrigation purposes	62% of treated wastewater recycled for reuse in irrigated agriculture	59% of treated wastewater recycled for reuse in irrigated agriculture	• MDG Report FY 2010 • MWI annual report for FY 2017	
Output 1.3: Securing Rainwater harvested for poverty pockets (Southern JV) and local community groups.	Quantity of rain water harvested (m^3) Number of farms/hectares using the water supply for supplementary irrigation m^3	316,000 in FY 2012	350,000 in FY 2015	MOA Report from Dept of Rainwater Harvesting for FY 2017	

Output	Indicator(s)	Baseline	Target	Source of Verification	Risks & Assumptions
Output 1.4: Providing fresh vegetables through Permaculture projects in the Jordan Valley	Amount of vegetable produced in (Kg / Year)	TBD in Full proposal	TBD in Full proposal	MOA Annual Report for FY 2017	Farmers cooperate with the project and provide the land and required Contributions. Political instability might cause effectiveness or implementation delay.
Component 2: Capacity Building at both the national and local/community levels respectively, knowledge Dissemination, policy and legislation mainstreaming.					
Outcome 2: Improved policies and regulations, strengthened institutional capacity to reduce risks, better Informed society on adaptation to Climate Change	Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses	Second national Communication on Climate Change 2009	Progress on Third National Communication on Climate Change	Third National Communication on Climate Change will be out by Dec 2017 Annual MDG report	Cabinet changes and reshuffles in the government may impact project thrust and momentum,
Output 2.1: Standards and policies reviewed & amended in support of climate change adaptation	Number of laws & regulations amended in support of climate change adaptation	National Self Assessment Report on Climate Change 2009	Progress on Third National Communication on Climate Change	Third National Communication on Climate Change will be out by Dec 2017 Annual MDG report	
Output 2.2: National entities receiving advisory on Climate Change adaptation & Number of community outreach, workshops, training events, seminars, conferences, etc.	Number of project Beneficiaries trained on water/agricultural adaptation measures disaggregated according to gender Number of lessons learned and best practices taken in the project outreach	National Self Assessment Report on Climate Change 2010	Progress on Third National Communication on Climate Change	Third National Communication on Climate Change will be out by Dec 2017 Annual MDG reports	Weak interaction and response of local communities and institutions to Climate change

Output	Indicator(s)	Baseline	Target	Source of Verification	Risks & Assumptions
	strategy				
Output 2.3: Jordanian Agribusiness exports	Number of new micro-enterprises created linked to the agribusiness industries	MOA Annual report and National Statistical Report	MOA Annual report and National Statistical Report	Annual MDG report MOA Annual report and National Statistical Report	Weak incentives for stakeholders, farmers and local communities to cooperate due to time lag for fruition of results,

C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

Mitigation Measures to Manage the Risks associated with treated wastewater reuse in Jordan

The Jordan water strategy (2008-2022) comes in line with the WHO Guidelines on Wastewater Use in Agriculture (2006) and now Jordan has fully developed Irrigation Water Quality Guidelines modeled after the Jordan ww effluent standard JS 893/2006 and the WHO 2006 guidelines. These guidelines aim at maximizing the **protection of public health** and the **beneficial use of the important resources** and were developed to be used as a basis for the development of international and national approaches **to manage the health risks from hazards associated with the use of wastewater in agriculture as well as provide a framework for national decision making**.

All wastewater treatment plants where the project will be tapping into their treated wastewater effluent for reuse have been subjected to an EIA and Environmental Management and Mitigation Plan (EMMP) according to Ministry of Environment EIA Regulation # 37 FY 2005 which includes identifying risks on the environment and social impacts and requires identification of mitigation measures during construction and future operation of the infrastructure. Each of these WWTPs also had a wastewater reuse master plan that complies with JS 893/2006 and the prevailing WHO guidelines at the time of the EIA. These EIAs were done under donor/lender funded WWTP where under the design and feasibility approvals process an EIA is required to meet the donor entity regulations. Please refer **to Annex 5 for EIA approvals** of these donors and the Ministry of Environment Jordan EIA committee review and approvals.

Environmental and Social Mitigation Measures Associated with Wastewater Reuse

Establishing the Post-2015 Development Agenda: Sustainable Development Goals (SDG) towards Water Security, the Jordanian Perspective Ministry of Water and Irrigation March 2014 Report

Climate change Mitigation Measures:

- The country is in need to further increase the wastewater treatment capacity and to rehabilitate existing ones. **Wastewater management** remains a major challenge for Jordan in particular due to the interdependency between wastewater disposal and groundwater quality. It is estimated 200 MCM of wastewater could be treated in addition of the current amounts (Water Budget 2012). Wastewater management in Jordan needs to adopt new effective technologies, flexible, modular and robust with minimal networks and pumping requirements in order to reduce the O&M requirements as well as energy requirements
- ***Jordan will set a Water and Sanitation Dedicated Goal* - Human Rights and Justice shall guide the regional and international efforts on this regard**
- Jordan developed its vision beyond 2015 that entails **dedicated global goal for water and sanitation:** Jordan supports fully the efforts of the UN Secretary General's Advisory Board on Water and Sanitation (UNSGAB) and other institution to dedicate a standalone goal for water and sanitation. A set of potential targets and indicators will be defined on national level that best advance its work for achieving and sustaining such global goal, it will also work with regional countries to achieve equitably the goal.
- **Access to clean water and safe sanitation should be recognized as a basic human right**
- **Jordan Supports a Dedicated Goal for Water and Sanitation post 2015**
- **The treatment and reuse of urban wastewater in agriculture** need to be promoted as well as the **benefit in methane conversion to energy in treatment systems** recognized.

Weak Water Governance:

Mitigation: The strategic national goals of Jordan water sector are set to achieve the following :

- Provision of safe, uninterrupted, reliable, and affordable access to domestic water for all.
- Provision of adequate quantity of water for economic activities including industry
- Greater understanding and more effective management of groundwater and surface water;
- Healthy aquatic ecosystems;
- Sustainable use of water resources;
- Fair, affordable and cost - reflective water charges in place;
- Measures implemented mitigating effects of increased population growth and economic development across all sectors which impact the water resources and their users;
- Prepared and adapted to challenges triggered by Climate Change;
- Efficient uses of water in irrigation are optimized.
- Increase the wastewater coverage kingdom wide

Soil Salinity

Soil salinity due to application of the treated effluent is an important reuse issue that needs to be closely investigated and mitigated through mitigation measures that reduce salinity such as leaching, crop rotation

and other sound environmental measures.

Soil Salinity Mitigation: For areas that are arid and semi-arid regions, such as the Jordan Valley and Wadi Mousa; irrigation is essential for economically viable agriculture. At the farm level, the following basic conditions should be met to make irrigated farming a success:

- the required **amount** of water should be applied;
- the water should be of acceptable **quality;**
- water application should be properly **scheduled;**
- appropriate irrigation **methods** should be used;
- salt accumulation in the root zone should be prevented by means of **leaching;**
- the rise of water table should be controlled by means of appropriate **drainage**;
- **nutrients** should be managed in an optimal way.

Basically, the components of an on-farm strategy in using treated wastewater will consist of a combination of:

- crop selection,
- selection of irrigation method, ,
- using the two sources in rotation and by blending conventional water with treated effluent
- adoption of appropriate management practices

- Continuously monitor the irrigated areas to assess the effectiveness of the irrigation management plan, and determine the degree to which excess irrigation water is entering the soil
- Annual application of phosphor-gypsum in designated rates.
- Vegetative bioremediation—a plant-assisted reclamation approach—relies on growing appropriate plant species that can tolerate ambient soil salinity and sodicity levels during reclamation of salt-affected soils.

Potential Contamination of Groundwater

Concerns are always raised regarding the possible contamination of groundwater due to the leaching of the TWW, following regular application for irrigation and the fate of such contaminants potentially polluting Ground water.

Mitigation Measure: The Jordanian Standard JS893 gives guidelines regarding the reclamation of wastewater for irrigation, and that the guideline parameter levels varied according to the types of vegetation to be irrigated. This standard, together with relevant World Health Organization Guidelines (*2006*), would be the basis of assessment as to the suitability of the wastewater for reclaimed water. The effluent from the proposed WWTPs complies with these guidelines in all cases. The possibility of nitrate leaching into the groundwater from urban irrigation practices is closely and continuously examined due to the possible long-term buildup of ammonia and nitrates in the groundwater, and to monitor the movements of groundwater in the area.

Risk of the Possibility of the Quantity of Reclaimed Water Exceeding Demand

Mitigation: the design figures of all the project WWTPs are conservative, and each treatment stream could accommodate flows more than the design capacity. In the event of production exceeding demand, extra storage capacity is made available by raising the level of water in the facultative ponds, giving a further storage. Also during a period of low demand for reclaimed wastewater, if the reclaimed reservoirs were full, excess urban reclaimed water production would be transferred to the agricultural irrigation system. In the case where the agricultural reclaimed wastewater reservoir is full, additional storage of up to four days' supply would be made available in the facultative ponds. The calculations were based on projected agricultural and urban reclaimed water demand.

Cooperation between the users of the reclaimed water (through JVA in the valley and PTDRA in Wadi Mousa) and the provider of the reclaimed water (WAJ in the valley and Aqaba Water Company in Wadi Mousa) should be carefully coordinated in order to maintain a stable supply and demand. Other measures suggested included appropriate monitoring of the storage systems to predict any possible overflow, or excess reclaimed wastewater, and the development of proper emergency plans. Other strategies such as the development of winter plantations were proposed to provide demand for the excess water.

Variations in Water Quality Due to Operational Failures

Mitigation Measures: the efficiency of the treatment process and the failsafe measures to be adopted in the event of a mechanical or biological treatment failure and the possible re-contamination of the treated wastewater due to re-growth of bacteria following the treatment phase, either in the storage tanks, the distribution system, or in the agricultural reclaimed wastewater open reservoir.

The WWTP operational procedures will be followed in the event of a breakdown in the treatment stream. In this case, no reclaimed water would be made available in the pilot distribution system, avoiding release of lower quality treated wastewater into the distribution system. Also no under-treated or badly-treated water should be permitted to leave the WWTP.

The concerns over the re-contamination of the reclaimed water following treatment

Mitigation: Effluent quality will be under control, given the use of UV disinfection to kill all pathogens, followed by the chlorination of the wastewater. The chlorination would provide a residual disinfecting agent in the wastewater, which would discourage the re-growth of bacteria during storage. In addition, all the piping and reservoir systems for the reclaimed water schemes are enclosed to prevent the possible intrusion of contaminants into the distribution system, or the growth of algae. Since no system will be 100 percent reliable, and that careful operational checks and controls would be required to ensure an adequate performance of the treatment systems.

The Possibility of the Reclaimed Water Failing to Comply with the End-Use Standards

Mitigation: If effluent quality fails compliance with the relevant standard. The monitoring and quality control procedures to implemented at the treatment stage, will ensure that the treated wastewater meet the required standards and there is a monitoring and quality control system in place of reclaimed water prior to leaving the treatment plant area. If a treatment stream is found, for whatever reason, not to be providing treated water of sufficient quality it would be redirected to the treatment plant.

Issues Concerning Public Health

Vector Breeding

The issue of vectors related to the sludge drying beds and attraction to the pond areas

Mitigation: This will be controlled well since the sludge will have gone through the digestion process, it will be unlikely to attract significant vector numbers. In addition, due to the prevailing dry climatic conditions, the thin sludge layer will dry quickly, discouraging pests and vectors.

Building water retention dams in a watershed always carries risks.

Mitigation: proper engineering designs for water retention systems will be practiced and an EIA coupled with EMMP in line with AF ESP will be conducted to ensure that no negative impacts occur such as changing the flood channels, vector breeding and excessive need for pumping takes place.

Odor

Concerns over ***odors released from the treatment processes***

Mitigation: This will not be an issue for the treatment plants as long as they are properly functioning, where minimal odors are released. Furthermore, the avoidance of odors at the plants is ensured by the use of aerobic processes only. ***Odors arising from landscape or irrigation usage is not a perceived problem*** as the reclaimed water leaving the plant meets all standards.

Issues/Risks Concerning the Pathogenic Content of the Reclaimed Water

Mitigation: This issue is taken into consideration in the treatment processes design which would mitigate this issue, namely the detention time of 10 days at one meter depth in the maturation ponds, and filtration, ensuring the removal of nematode eggs, and the UV disinfection, followed by chlorination. The team also noted that both the Jordanian Standard (JS893) and World Health Organization Guidelines (2006) for the reuse of wastewater for irrigation, would be followed, and that these provide standards for bacterial and pathogenic content. This risk has been well assessed by Duncan Mara study and is mitigated by the national monitoring system. Also the GIZ evaluation conducted by Professor Duncan Mara demonstrates the safe use and low pathogenic content .

Concerns over the Potential for Misuse of the Reclaimed Water

Mitigation: Public education campaign would be enforced and instituted to inform and educate the public regarding the dangers and benefits of treated wastewater. Regarding the potential for misuse of the reclaimed wastewater, it is noted that appropriate measures would be taken to clearly identify the wastewater as different from the potable supply. These measures include different colors and
pipe material for the urban reclaimed water system (purple pipes), labeling of the faucets, and special valve handles on the irrigation turnouts. Furthermore, each point where reclaimed water delivered for irrigation will have a warning on the cover of the delivery point that the water is not for drinking purposes.

Storage Capacity

TWW produced during times of low demand (i.e. the winter months) exceeding storage capacity

Mitigation: Normally Storage is needed for the following reasons:

- To equalize daily variations in flow from the treatment plant and to store excess when average wastewater flow exceeds irrigation demands; includes winter storage.
- To meet peak irrigation demands in excess of the average wastewater flow.
- To minimize the effects of disruptions in the operations of the treatment plant and irrigation
- system.

Storage is used to provide insurance against the possibility of unsuitable reclaimed wastewater entering the irrigation system and to provide additional time to resolve temporary water quality problems. is taken care of in the WWTPs designs and reuse plans. The proposed scenario for effluent reuse involves wadi (valley) discharge of treated effluent only in emergency cases, such wadi discharge is expected to take place during the winter months when agricultural demand for the reuse water is low and the hydraulic load on the TP is the highest. There is, however, a possibility that some wadi discharge will occur if insufficient additional land is acquired for reuse but effluent discharged must meet JS 893/2006.

Utilization of Enhanced Irrigation Management Practices

Irrigation management using reclaimed water should take into account the timing and method of application of the water. Ideally, the design of an irrigation system should be based on the type of plant, time of year, soil type, climatic conditions and general characteristics of the area.

Mitigation: it is important to minimize as far as possible the amount of excess water, and specifically the amount of excess nitrate that is applied to the plants, the actual irrigation practices must be carefully controlled. The following are some suggestions:

Use of Drip Irrigation Techniques

A properly designed and installed drip irrigation system will help to ensure that the water is applied to the plant root zone where it will be required. Ideally, the planting pattern will be designed in conjunction with the drip irrigation system. Nonetheless, it is estimated that drip irrigation systems have losses to leaching of around 15 % compared to surface irrigation methods with potential losses of up to 50%. Drip irrigation therefore makes it possible to match the amount of nitrate applied to the needs of each plant growth stage, unlike sprinkler systems. The use of a drip irrigation system, properly designed according to the planting pattern is recommended.

Balance of Supply and Demand

The supply of TWW should be restricted to the plant demand levels, preventing excess water seepage into the groundwater. The plant's irrigation demand will vary according to season and weather conditions. The natural tendency with areas of landscaping is to over-irrigate, in order to increase the greenness of the landscape. Over-irrigation will simply ensure leaching into the groundwater, and should be avoided.

Irrigation Management Plan

The management of the irrigated water is therefore an extremely important issue. It is therefore recommended that the ultimate user and manager of the reclaimed water, draw up a management plan, outlining the proposed irrigation practices, including how the water demand will be assessed and the supply regulated accordingly. This plan should explicitly take into account means to reduce over irrigation.

Uphill pumping of treated wastewater,

Mitigation: Uphill pumping will be minimized to reduce costs of fuel and greenhouse gas emissions by use of diesel fuel. There is already a system in place for the irrigation mains (primary and secondary) and treated wastewater will be pumped to the farm turn out where almost all farmers at JV practice pond storage due to irrigation scheduling by JVA. While in wadi Mousa this will be practiced to the minimum.

Socioeconomic Risks and how they will be mitigated:

- **Water demand pressure**: **Mitigation:** The proposed project pilots are expected to alleviate some of this existing problem that is depleting groundwater sources for agriculture.
- **Limited Jobs available for local communities**: **Mitigation:** New jobs will be created for farm workers.
- **Climate change negative impacts**: **Mitigation: Mitigation:** Reuse of the effluent will turn climatically impacted barren lands into productive farmland.
- **Low awareness of farmers and beduins on the pros and cons of ww reuse**: **Mitigation:** Farmers need to be better informed about the risks and benefits of using the treated effluent.
- **Public perception of the project's goals is a significant issue**: **Mitigation:** Public perception must be well managed and be fully considered before successful implementation of the reuse scheme can be expected.
- **Farmers, beduins and beduins livestock coming in direct contact with treated wastewater: Mitigation:** Public health education of the farmers operating the pilots will ensure reduced risk of coming into direct contact with treated wastewater without proper health and safety precautions. Also livestock should not be allowed to drink from reclaimed water ponds and irrigation networks to avoid miscarriages due to presence of endocrine receptors in the treated ww.
- Overflows of partially untreated or untreated wastewater: **Mitigation**: Sanitation in the pilots will be improved due to reduced risk of overflows of partially untreated or untreated wastewater.
- Rising costs of fodder and fertilizers: **Mitigation** Reuse of the proposed WWTPs' effluent can eliminate the need for costly fertilizer, improve soil conditioning, and conserve groundwater resources.
- Farmers and beduins unaware of proper cropping patterns: **Mitigation** Cropping patterns should be disseminated; Fodder cultivation in Wadi Mousa will be encouraged since it withstands saltiness, a cash crop and a source for beduin livelihoods.
- Farmers and beduins reject switching to reclaimed water: **Mitigation** Reclaimed water supply should sold at encouraging prices to encourage switch from fresh to reclaimed wastewater. Reaching out to the local community through awareness campaigns that would explain the benefits of the project, such as the socioeconomic benefits of effluent reuse.
- Contractors usually bring their own staff from external areas, and preventing the local community from getting the economic benefits. **Mitigation** There should be coordination between the project management and the vocational training centers in JV and Wadi Mousa to train local labor prior

Public Health & Occupational Safety Issues:

- Workers unaware of Occupational safety measures: **Mitigation** need to be enforced to ensure workers' safety while dealing with wastewater reuse, aeration ponds or sludge handling.
- Low sanitation conditions in pilot areas: **Mitigation** Sanitation is expected to improve due to increased coverage of the sewer networks and enhancement of effluent quality, and mobile toilets availability on the reuse pilots.
- Farmers and beduins unaware of safety precautions: **Mitigation** The provision of warning and guidance signs for the locations of the reuse to inform the public of the associated health hazards and needed precautions. Also a helath screening and vaccination program will be needed especially for HIV transmission and Hepatits B and C.

Gender Risks

Mitigation: Gender is a crosscutting issue that impacts on a limited range of project implementation activities. Among the stakeholders in the pilot projects, only Wadi Musa currently has a discreet community participation component. There is a real need for interventions that will

help them to conserve their limited water supplies and increase their income generating activities, particularly in non-agriculture activities. There are an increasing number of new agriculture technologies and techniques which can help augment water supplies, conserve water use or reduce inefficiencies. For example rainwater harvesting is often used to secure drinking water or and recycled grey water is used in small house gardens.

Lessons learned from these interventions: women are key stakeholders, and can manage water resources as well or even more efficiently than male counter parts. More investment in their technical knowledge and capacity as well as providing them with financial support and equipment will help ensure better water practices as well as leverage their engagement and involvement in decision making both at the household and community levels.

Some of the major gender-impact mitigation issues the Project will be addressing in the context of development of the Wadi Mousa ww reuse farming site:
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 expansion of the pilot farming site.
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 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 byproducts, 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.

Additional gender issues for consideration for future phasing of the program:
9. Assessing how changes in cropping patterns (e.g., cash cropping vs. subsistence cropping) and household income affect women?
10. Enabling women to become more actively and meaningfully integrated into the operations and management of wastewater user organizations? If membership in such organizations or NGOs is predicated on land ownership, explore opportunities for joint memberships of husbands and wives.
11. Inclusion of specific employment benefits for women by the project, in the project design.

Beduins In Wadi Mousa

- Near the ruins of Petra in southern Jordan lies the Wadi Musa Water Re-Use project, a joint initiative of USAID, the Ministry of Water and Irrigation and the Petra Tourism and Regional Development Authority (PTDRA) which has considerable experience in working at the grass roots level with rural communities.
- USAID Jordan initiated the implementation activity, "Wastewater Reuse Implementation Activity" which focused on using treated effluent from wastewater treatment plants for either

agriculture purposes with the intent to reduce the demand for high quality water(where USAID has funded the development of a wastewater treatment facility)

- The project will continue to address quality standards and legislative aspects impacting reuse applications and demonstrated the socio-economic viability of reuse through pilot projects/demonstration plots. In doing so, it demonstrated to decision makers and the local communities and beduins who use the wastewater and public at large that water reuse is an effective, viable and safe component for managing Jordan's water resources. Most importantly it demonstrated that controlled reuse in Jordan can be reliable, commercially viable, socially acceptable and environmentally sustainable.
- The proposed AF funded program will work towards practical and effective approaches to the reuse of reclaimed water. It will incorporate poverty alleviation, adaptation to climate change, economic improvement and long-term project sustainability at the "grass roots" level. Changing cropping patterns from traditional crops, vegetables and fruits to moderate water consuming cash crops such as fodder, wheat and barley that can tolerate considerable climatic stress, improves marketability and management.

Mitigation: By following the results of the socio-economic study and its recommendations, and continuing to work through PTDRA and the tribal heads, the project continuation will these beduin farmers at the Wadi Mousa project are from the local Bedouin tribes who at first viewed the wastewater treatment plant as awful and ugly. They gradually embraced its use; both men and women are now running the local cooperative "Al Sad Al Ahmar" that manages water and land allocation for the tribe. In fact, the project has been so successful that farmers are now taking the initiative to sell produce to farmers from other tribes.

Natural Resource Risks

- Leachate leakage: **Mitigation** lining ponds with HDPE to avoid leakages, and help maintaining groundwater quality.
- Bird transmitted diseases (such as bird flu) and their implications to public health. **Mitigation** direct contact with bird dropping should be discouraged and implications explained to labor force

National Environmental Safeguards

In Jordan, environmental approval for projects is provided by the Ministry of Environment's EIA Regulation no. 37/2005 which categorizes projects according to impact as per Annex 1 below: Category —CI projects are subject to EIA, with social safeguards embedded in the EIA. The screening and review procedures must be carried out before sub-projects are financed in order to prevent funding of economic activities with negative impacts on human development and the environment.

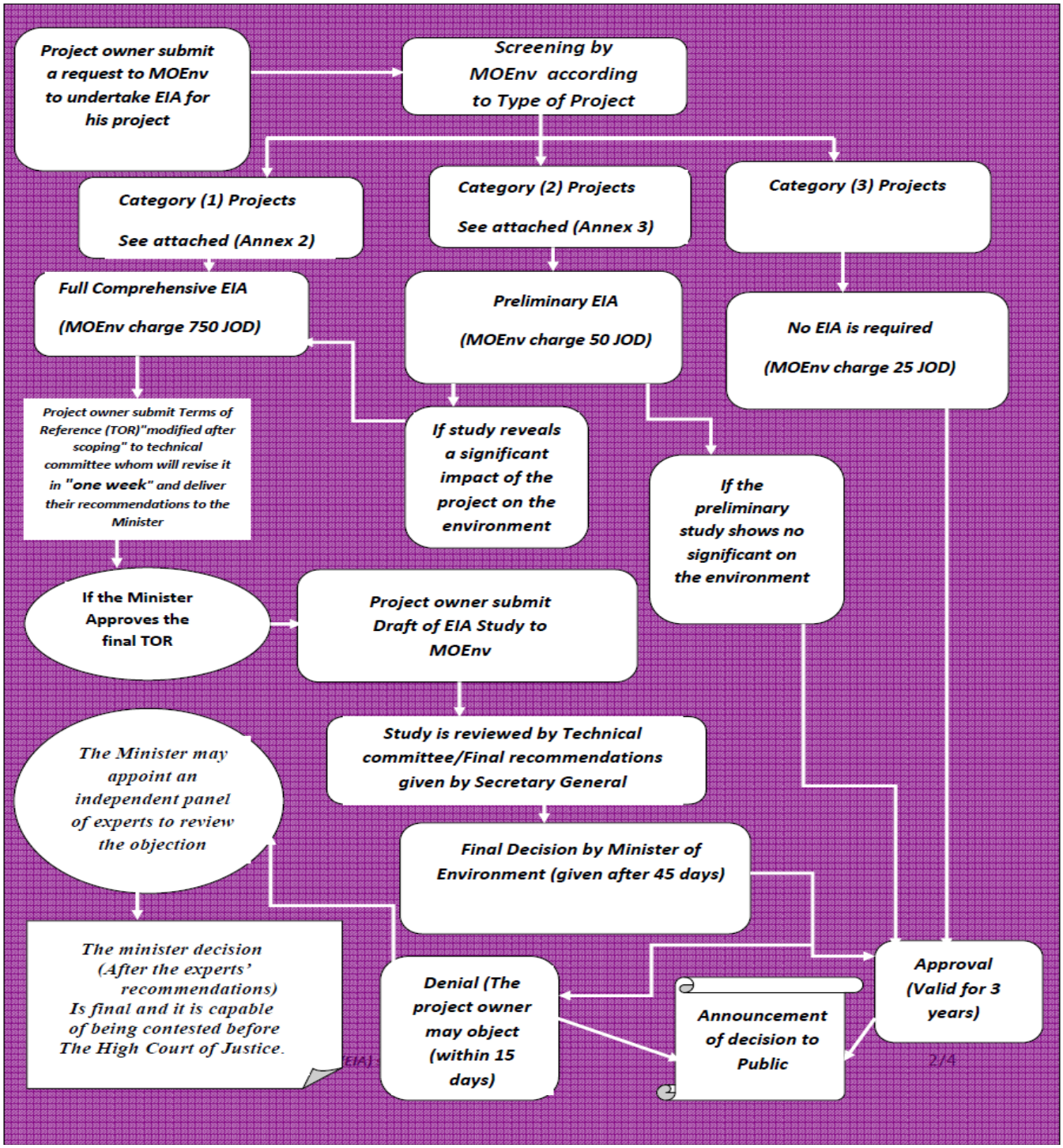
The Ministry of Environment under the obligation of providing an opinion on the EIA within 14 days of receiving the EIA; Category—CII projects require an initial environmental assessment and are subject to standard mitigation procedures while Category III projects require no environmental analysis. After screening and approval of the impact assessment by the Ministry

of Environment, the sub-project is cleared for financing under the Facility. Mitigation actions would be specified as an Annex to the impact assessment, which would include: impact; mitigation; party responsible for mitigation; monitoring indicator; indicator; timing; cost. Independent annual supervision may monitor indicators such as waste management, verify if mitigation actions are being taken and indicators monitored, and cumulative impacts.

Jordanian policies are modeled after the World Bank operational guidelines and polices. Operational Policies (OP) and Bank Procedures (BP), are designed to protect the environment and populations from potential negative impacts of projects, plans, programs and policies and as such; Category A (World Bank (WB)/Category I (Jordan) sub-projects would not be eligible for funding under this project, furthermore, sub-projects that trigger OP/BP 4.04 (Natural Habitats), OP 4.12 (Involuntary Resettlement), OP/BP 4.36 (Forests), OP/BP 4.37 (Safety of Dams), OP/BP 7.50 (that affect International Waterways) and OP 7.60 (Disputed Areas) would not be eligible for financing; OP 4.10 (Indigenous People) would not be triggered.

Safeguard Policies Triggered by the Project	Yes	No	TBD/completed
Environmental Assessment OP/BP 4.01	✓		Already conducted for the WWTPs and reuse pilots, with the clearance of the EIA and EMMP.
Natural Habitats OP/BP 4.04		✓	
Forests OP/BP 4.36		✓	
Pest Management OP 4.09		✓	
Physical Cultural Resources OP/BP		✓	
Indigenous Peoples OP/BP 4.10		✓	
Involuntary Resettlement OP/BP 4.12		✓	
Safety of Dams OP/BP 4.37		✓	
Projects on International Waterways		✓	
Projects in Disputed Areas OP/BP		✓	

Environmental Impact Assessment (EIA) systematic procedure



ANNEX (2): Projects, which need a comprehensive EIA, study:

1- Raw petroleum Refining.

2- Electricity generating plants.

3- An establishments designed as permanent stores
or as landfills for the irradiant nuclear wastes.

4- Iron and steel factories.

5- Establishments for extracting, treatment, conversion the asbestos and the substances which asbestos part of its structure.

6- Integrated chemical industries such as:

- *Petrochemicals.*
- *Fertilizers, pesticides and peroxides industries.*
- *Chemical products, petrochemicals and petroleum storage facilities.*

7- Roads, airports and rails constructing projects.

8- Hazardous wastes treatment plants and disposal from these wastes.

9- Establishing the industrial cities.

10- Extraction industries:

- The excavating processes for water and the geo- thermal digging except the digging for investigating the soil.
- Mining processes and relevant industries.
- Natural fortunes extraction.

11- Generating energy industries.

- The industrial establishments which producing electricity, vapor, hot water.
- The industrial establishments which conveying gas, vapor, hot water and electrical energy.
- *Natural gas surface storage.*
- *Flammable gases storage under ground surface.*
- *Fossil fuels surface storage.*

12- Tanning (leathers) factories.

13- Sugar factories.

14- Yeast factories.

15- Building up Marine ports.

16- Establishing ships and boats for industrial and recreational purposes.

17- Sea dumping for using the land in industrial and recreational uses.

18- Glass factories.

19- Establishing slaughterhouses (abattoirs).

ANNEX 3: Projects need initial EIA study

1- Agriculture Projects:

- Poultry Farms if the capacity exceed 30.000 birds,
- Caws Farms if the capacity exceed 50.000 caws.
- Sheep Farms Caws Farms if the capacity exceed 1.000 sheep.

2- Minerals treatment projects:

Iron and steel works including galvanizing, varnish factories.

Establishments producing non-irony minerals including production, purification (washing), liquefying, demonetizing (pulling) and galvanizing processes.

- Compressing Bullions.
- Treatment of minerals surfaces and covering (coating).
- Boilers, cisterns, tanks, industrialized from minerals plates.
- Establishments for felting and scorching (roasting). Raw minerals
- Complexes industry and aligning (collecting).

3- Food Industries:

- Oils, animal and vegetarian fats.
- Bottling, Packaging the animal and vegetarian products.
- Milk products industry.

4- Fabric, leather, wood, papers and tissues industries.

5- Rubber industry.

6- Infrastructure projects including housing projects.

7- Other projects:

- Municipal landfills
- Landfill for disposal from junk.
- Sports activities centers.
- Junk storage establishments.

8- Any additions, amendments on the projects that mentioned in this annex.

For greater efficiency, in Jordan the implementation of an ESIA is usually integrated with the process of the (EIA), which is supposed to ensure that the project activities have no significant negative or long-term social or environmental impacts. By following the methodology of the ESIA

the executing entities ensure that they avoid, reduce or mitigate the negative impacts to an acceptable level. As part of the ESIA a "negative list" excludes certain activities such as: those universally excluded by donors (weapons, illegal activities, Casinos, etc...), in addition to those affecting natural habitats, forests, endangered species, forced relocation of populations, dams, watercourses, and activities in the disputed areas.

The ESIA provides that, at the national level, an annual evaluation is made to assess the cumulative impacts that were considered negligible at the level of individual projects, and to modify mitigation measures if need accordingly. ESIA also provides training to execution stakeholders to allow examining environmental conditions preceding the activities. This methodology is almost universal and is commonly reproduced in similar forms in the countries concerned. In Jordan, for example, the national regulation define a list of projects that must do a comprehensive Environmental and Social Impact Assessment (ESIA) in addition through the Screening processes unlisted projects could be asked to conduct an ESIA if they prove to have significant negative environmental impacts. In addition, the national Jordanian regulations divide the projects into three categories that correspond roughly to the three categories of the World Bank.

The ESIA is based on a two-step approach:

1. Make an environmental ("screening") to determine the environmental category of the activity to be financed;
2. Implement the appropriate procedure relative to the determined category. This is could be described in three categories and three modes of operation:
    a. Important impact (Category "A" according to the WB and the ADB) or excluded activity under the negative list: project is excluded;
    b. Average impact (Category "B" according to the WB and the ADB) ESMP is completed and the tender documents signed in accordance with the Jordanian regulations;
    c. Negligible or absent impact (Category "C" according to the WB): no impact assessment is required.

An Environmental and Social Management Framework (ESMF) is also developed to comply with the AF Environmental and Social Policy in order to identify, minimize, avoid, screen out, mitigate and monitor potential social and environmental impacts in compliance with AF Policies, and the Jordanian applicable environmental laws and regulations. The ESMF will be applied by the Ministry of Environment (MOE) in the supervision of sub-project activities to be financed by the project.

The ESMF will consist broadly of: (i) a screening mechanism to determine the environmental category of the sub-project; and (ii) impact assessment and mitigation. For its application to Jordan, assessment and mitigation measures would be done according to the Jordanian environment law. In the event an ESMF is needed it will be prepared to the satisfaction of the

GEF-Adaptation Fund, and will be disclosed in Jordan on the MOE website and to the public for review and comment.

Impact minimization and mitigation measures would therefore be prepared by the sub projects execution entities. In most cases, the negative environmental impacts that may be generated by the subprojects would be easily mitigated by complying with national laws and through the implementation of the ESMF, which includes a screening mechanism against common environmental impacts such as the generation of waste, wastewater, dust, noise, disturbance to traffic, potential injury to personnel, negative impacts on flora and Fauna, habitat endangering, negative impacts on archaeological sites, and land degradation, according to applicable GEF and national safeguards. It is anticipated that for subprojects with negative impacts, in most cases, the preparation and implementation of subproject-specific Environmental and Social Management Plans (ESMPs) would be sufficient. If subprojects are Categorized according to Jordan EIA regulation no. 37/2005—as CI or CII then an environmental action would be required but if categorized as C III, no environmental action would be required.

The existing procedures that would be employed would follow national EA regulations and safeguards where mitigation measures get detailed coupled with connecting the institutional objectives with potential risks that would hinder achieving such objectives in order to build the risk assessment and mitigation measures matrices which requires setting priorities and identifying risk values. At programme/project level, internal (internal/regulatory environment) and external (partners and beneficiaries) risks would have to be identified to assist in determining and treating and protecting actions. Moreover, SWOT analysis is used to assess that to which extent the institutional objectives assist in achieving national objectives.

The Ministry of Planning and International Cooperation (MoPIC)'s - Enhanced Productivity Program (EPP), has this in house capability within its staff members in particular with social safeguards (and will ensure close consultation with Ministry of Environment and if needed the secondment of a local expert to be funded directly through MOPIC resources to support the project), the National Center for Agricultural Research and Extension (NCARE), Ministry of Water and Irrigation, Ministry of Agriculture (MOA), NGOs, WUAs ,farmers and other stakeholders of the project activities take place

The application of the ESMP of the AF would be based on the background studies and surveys needed and available statistical needs that are established within the EPP data base of poverty pockets and youth/gender priority needs and priority areas (socio-economic surveys, national statistical database, and institutional capacity assessments and needs). The project

Management Unit (PMU) at the EPP will have the overall responsibility for implementation of the EMPs in relation to environmental and social safeguards in close coordination with the project implementing agencies

MOPIC has an established a grievance mechanism within the EPP manpower resources and will dedicate a focal point at the EPP to provide that support and offer communities an effective avenue for expressing concerns, achieving remedies, and promoting a mutually constructive relationship. MOPIC has identified a central point for coordination within the project PMU to address concerns related to the project. MOPIC will make available to the public who and how to contact through the website, and be responsible to respond to complaints in writing or by phone within a week of the complaint. A record will be kept of the complaints and how they were responded to. MOPIC will periodically conduct an internal assessment of the grievance mechanism to evaluate and improve its effectiveness.

Social Safeguards

Social safeguards experts are available at the MOPIC EPP which will be the Implementing Entity for the project for the monitoring and implementation of social safeguards issues. Environmental safeguards are enforced by the M. of Environment and can be seconded to the PMU using MOPICs own resources. The MOPIC Social and Safeguards experts working for the EPP will review institutional objectives at programme/project scale, screen potential risks that may be connected with implementation activities, prioritize potential risks and build risk assessment matrix, identify mitigation and social/environmental protection actions. Environmental safeguards are available at the M. of Environment and can be seconded to the PMU using MOPIC's own resources.

The PMU will be responsible for implementation of contracts/works, and will report to the CC Adaptation Fund on implementation, including compliance with ESMF. MOPIC will be accountable for the monitoring and reporting on safeguards issues. The PMU will be responsible to aggregate information on compliance with the ESMF, and include as a section in the reporting to the CC Adaptation Fund. Social safeguards experts are available at the EPP for the monitoring and implementation of social safeguards issues.

GRIEVANCE MECHANISM: MOPIC PMU will need to have a process that is clear and transparent process for receiving grievance and redress, with a clear process of how they will receive and handle complaints. The process should include a clear way of informing the public where to send their concerns (how they advertise this-ie. website, newspaper, application form, banners, etc.), how long it will take the PMU to respond (in a timely manner) and how they plan on responding to complaints (ie. face-to face, meetings, etc.).

The Table presented in Section Part II K as a sample of an EMMP which is part of the EIA for the North Shouneh WWTP and the associated Pilot. The EMMP identifies risks, mitigation measures, responsibility and the frequency of the actions required under the mitigation. A similar EMMP has been done and approved for Wadi Mousa, Irbid and Tal Mantah WWTP under the EIAs carried for them.

The Table below demonstrates the EMMP Mitigation Measures Matrix for the Jordan Valley as developed by the National Plan for Risk Monitoring and Management Sustem for the reuse of treated wastewater in Irrigation for Irrigated areas Upstream and (downstream of King Talal Reservoir (KTR), Nov 2011 supported by GIZ.

Risk Assessment and Management Downstream in Jordan Valley	**Mitigation and Risks Management Plan Downstream in Jordan Valley**					
Affected Target	**Existing Control Measures**	**Reassessment of risk post-control**	**Reference**	**Existing Monitoring Programmes**		**Risk Manage**
				Programme	**Actor**	**Programme**
Before farm						
Water in the Wadi and in the Canal	Fences in some locations along the Canal, partially enforced regulations	The risk still exists because of the partial existence of the fence along the Canal, also there is no protection zone along the Wadi wherever there is a groundwater well used for drinking purposes. Still there is no real enforcement of the safety regulations by the responsible institution		Irrigation water monitoring programme (Telal Al-Thahab, Abu-Zeighan Outlet, Mu'adi and Thahret Al-Ramel)	JVA	Locate fences wh appropriate along Canal. Put warning that prohibit throw waste Put signs prohibit swimming and the u this water for dom purposes. Strengthe role of the Env. Poli intensify their deplo Enforcement of ena regulations that gove use of this water as v a punishments f violators. strengthe role of Env. Police intensify their deploy

				Environmental inspection, enforcing environmental laws, and recording violations	Env. Police	Conduct intensiv awareness programm public on the pros an of using this wat
						Intensify the exten services programm the proper way disposing the solid at farm level
						Put warning signs prohibit grazing ani nearby the Cana
	Partially enforcement of regulations	Medium				Enforcement of exi regulations and punishments as we conducting intens supervision progra
	Screening system upstream at Telal Al-Thahab	Medium				Rehabilitation of screening system to the risk as much possible

Risk Assessment and Management Downstream Jordan Valley	**Risk Assessment and Management Downstream Jordan Valley**					
Affected Target	**Existing Control Measures**	**Reassessment of risk post-control**	**Reference**	**Existing Monitoring Programmes**		**Risk Manage**
				Programme	**Actor**	**Programme**
Nearby Communities	**Nearby Communities**					
People, picnickers	Fences in some locations,	The risk still exists because of the		Environmental inspection,	Env. Police	Locate fences wh appropriate along

	partially enforced regulations, Signs, weakness of awareness	partial existence of the fence along the Canal, also there is no protection zone along the Wadi. Still there is no real enforcement of the safety regulations by the responsible institution		enforcing environmental laws, and recording violations		Canal. Put signs pro the swimming in t Canal. Conduct awar programmes for pu Strengthen the role o Env. Police and inte their deploymen
Ditch Riders and JVA staff						Raise the awarenes JVA Staff on the pr hygienic practices d their daily work. Pro ditch riders with sa clothes
On farm Level	**On farm Level**					
Farmers/ Workers	weak awareness, accessible health centers, insufficient extension services	Risk still exists because of the insufficient extension services and the weak awareness				Conduct intensiv awareness programm the personal hygie issues
Collection Ponds	weak awareness, insufficient extension services	The risk still exists high because of the weak awareness				Conduct intensiv awareness programm the personal hygie issues
	Ban on the use of fresh manure	Low	Jordan Ministry of Environment	Programme for promoting the use of compost in cultivation	MoEnv	Intensify the implementation of programme and se punishment system g the use of fresh ma
	weak awareness, no fences	The risk is still Medium because of the weak awareness and no fences				Conduct intensiv awareness programm the importance of pu fences around the p
Fish raising/ Consumers		Medium				Prohibit the use of T for fish raising. Form an official standard fish raising. Establ

						monitoring program for fish raising far

Risk Assessment and Management Downstream KTR	**Risk Assessment and Management Downstream KTR**					
Affected Target	**Existing Control Measures**	**Reassessment of risk post-control**	**Reference**	**Existing Monitoring Programmes**		**Risk Manage**
				Programme	**Actor**	**Programme**
On farm Level	**On farm Level**					
Drip irrigation system	Acid injection	by regular maintenance, the risk of clogging is low				Intensify extension s programmes for far that address clogg problems
	filtration systems, maintenance at farm level, and the existence of the screening system upstream at Telal Al-thahab	Medium				Rehabilitation of screening system to the risk as much possible. Use of filt system
Soil	weak implementation of GAP	the risk of increasing soil salinity still exists because of the insufficient extension services		Non-obligatory Soil Monitoring Programme Researches on soil salinity	JVA NCARE	Strengthening the ex extension activitie address soil qual deterioration
Ground-water wells used for drinking	ground water protection zones	Low				Ground water prote zones must cover a ground water wells for drinking purpos order to keep the ri low as possible. Co

						routine monitori programme for G Conduct awarene programme for pu
Animals		Medium				Use fresh water watering the anim whenever its poss
	weak awareness	Medium				Put warning signs pr grazing animals on s irrigated crops Strengthening the r Env. Police

Risk Assessment and Management Downstream KTR	**Risk Assessment and Management Downstream KTR**					
Affected Target	**Existing Control Measures**	**Reassessment of risk post-control**	**Reference**	**Existing Monitoring Programmes**		**Risk Manage**
				Programme	**Actor**	**Programme**
Crops at farm level	**Crops at farm level**					
High crops	Drip irrigation, mulch	Low	WHO Guidelines 2006: **4** Pathogen log reduction	Fresh Vegetables Monitoring Programme (low, leaf, root crops). Places (JV and AWSM)	JFDA	Intensify extensio services programme farmers to ensure pr implementation of co measures (drip irriga and mulch) and disco the use of surfac irrigation
Low crops	Drip irrigation, mulch	Low	WHO Guidelines 2006: **2** Pathogen log reduction			
Leaf crops	Drip irrigation	Low	WHO Guidelines 2006: **2** Pathogen log reduction			

		Low				
		Low				
Root crops	Drip irrigation,	Medium	WHO Guidelines 2006: **2** Pathogen log reduction			
Root crops & Leaf crops	Ban of using the fresh manure in cultivation	Low	Jordan Ministry of Environment	Programme for promoting the use of compost	MoEnv	Intensify the implementation of programme and se standard that goverr use of fresh manu

Risk Assessment and Management Downstream KTR	**Risk Assessment and Management Downstream KTR**					
Affected Target	**Existing Control Measures**	**Reassessment of risk post-control**	**Reference**	**Existing Monitoring Programmes**		**Risk Manage**
				Programme	**Actor**	**Programme**
Harvesting, Handling and Marketing	**Harvesting, Handling and Marketing**					
Different types of crops	small percentage of farmers have an access to hygienic facilities	Risk is still high to very high due to the weak awareness				Conduct intensiv awareness programn the personal hygien on the product saf

	small percentage of farmers use fresh water (wells and springs, wadis) to moisten the harvested crops					
Consumers	**Consumers**					
Cooked Crops/ Consumers	Cooking	Risk is mitigated	WHO Guidelines 2006: **5-6** Pathogen log reduction			
Fresh eaten	**Fresh eaten**					
Vegetables/ Consumers	Washing , peeling	Low	WHO Guidelines 2006: **1-3** Pathogen log reduction			Conduct continuo awareness programm the good hygiene pra in dealing with fresh crops at household
Leaf crops/ Consumers	Washing with mild disinfectant	Low	WHO Guidelines 2006: **2** Pathogen log reduction			
Root crops/ Consumers	Washing , peeling	Low	WHO Guidelines 2006: **1-3** Pathogen log reduction			

POLICY, LEGAL FRAMEWORK AND MANDATORY CONSULTATIONS

The following list provides relevant national environmental legislations and the international agreements

and conventions in which Jordan is participant.

Environmental Protection and EIAs

In accordance with Article (23) of the Environmental Law # 52 FY 2006, The EIA Regulation number (37) for 2005 – Regulation on Environmental Impact Assessment. The Regulation provides direction for conducting environmental impact assessments for all types of projects including the main issues to be covered by an EIA, reporting procedures, and the approval process. “Every institution, company, plant or any party that, after the enforcement of the provisions of this law, exercising an activity which has a negative impact on the environment, shall be obliged to prepare a study of the environmental impact assessment for its projects, and refer same to the Ministry in order to make the necessary resolution in this effect”.

The following other regulations have also been issued pursuant to the Environment Protection Law:

- Nature Protection.
- Environment Protection from Pollution in Emergency Cases.
- Water Protection.
- Air Protection.
- Marine Environment & Coastal Protection.
- Natural Reserves & Parks.
- Management, Transport and Handling of Harmful & Hazardous Substances.
- Management of Solid Waste.
- Soil Protection.
- Charges & Wages.

Water & Wastewater : Water Authority Law (18/88) – Water (Annex 4) – is described as the most far-reaching statute pertaining to water pollution. Article 3 of this law created Water Authority of Jordan (WAJ), and article 5 provides full responsibility to Ministry of Water and Irrigation (MWI) for all water and sewage systems and for establishing a water policy. Article 6 charges WAJ with its responsibilities.

The Public Health Act (1971) also serves as the basis for the regulation of wastewater discharges and water quality in Jordan. Pursuant to the Public Health Act, standards for the discharge of wastewater have been established. These are discussed in Section 3.2. Article 4 of the Control of Spoiled Sites Regulations (1978) reiterates some of the above Public Health Act provisions and further establishes the right of the president of the municipality, based on the health inspector’s recommendation, to take such actions as may be deemed appropriate against the violator. The Town and Country Regulations Act (1966) allows Local or Regional Councils to take action against the operator of any wastewater system that is found to be a nuisance and order that the nuisance be corrected within a specified period of time.

Air quality, noise & waste management: Air quality is regulated under the Public Health Act (1971), The Control of Spoiled Sites Regulations (1978) and The Traffic and Transportation Law (1984). Noise is regulated under the Town and Country Planning Act (1966), the Control of Spoiled Sites Regulations (1978), the Local Authorities Act (1955), the Monitoring and Organization of Public Markets Regulations (1961), the Traffic and Transportation Act (1984), the Public Health Act (1971), and the Environment Law. Solid waste management is regulated under several statutes, including the Public Health Law, Control of

Spoiled Sites Regulations, the Town and Country Planning Act, and the Environment Law.

Terrestrial ecology & antiquities: Terrestrial ecological resources are afforded protection under the Agriculture Law (1973) and the Hunting and Protection of Wild Animals and Birds regulations No 113 (1973). Agriculture Laws No. 20 and No. 113 (1973) contain chapters on plant and forestry protection, registration of crops and pesticides, orchard and nursery regulations, fertilizer use, soil conservation, and range-land administration. Under Article 9 of the Law of Antiquities, it is unlawful to destroy, disfigure, or cause any harm to antiquities, including causing changes in features, disconnecting any part thereof, altering it, sticking advertisements or attaching any plates to them.

Labor & safety: The construction and operation of the wastewater treatment plants will be affected by Labor Law No. 8 for 1996 including all of its subsequent amendments. Article (12) of Chapter 3 of the Labor Law pertains to nationalities and work permits. Articles under Chapters 4 and 7 relate to contracts and wages. Articles under Chapter 8 specify, among other things, working hours, leave and juvenile employment. Articles under Chapter 9 (titled **"Safety and Occupational Health")** cover the obligations of the employer to provide a safe working environment for his workers, increased risks on the job and for the public, precautions and measures to be followed in the workplace, and protective and therapeutic medical care. Articles under Chapter 10 (titled **"Work Injuries and Occupational Diseases")** provide for issues related to work injuries and occupational diseases for those employees who are not covered under the provisions of the Social Security Law of Jordan. Labor Law Attached in Annex 5

The Jordan National Building Codes also establish design principles and minimum requirements needed to ensure public safety of structures, provide sound and efficient electro-mechanical services and to safeguard against earthquake risks.

Relevant standards: At present, there are two approved sets of water and wastewater treatment standards that are of relevant to this project:

· The Jordanian Standard for Reclaimed Domestic Water - No. 893/2006
· The Jordanian Standard for Sludge – Uses of Sludge in Agriculture - No. 1145/1996 Wastewater treatment and reuse

JS893/2006 on "Reclaimed Domestic Water" has two primary components: i) reclaimed water discharged to streams, wadis or water bodies and ii) reclaimed water for reuse. Reclaimed water for reuse standard in turn has two subsets. The full standard is attached in Annex 6. Reclaimed water specifications under this standard are divided in to two main parts and should conform to specified conditions for every part and according to the final planned use and it is not allowed to dilute reclaimed water by mixing it in the treatment plant with pure water to achieve the stated conditions in this specification.

A: Reclaimed water for Wadi (valley) discharge

B: Reclaimed water for reuse purposes

Jordanian Standard 202/2007 Note : No treated industrial wastewater will be utilized or reused under this project noting that industrial effluents are not allowed into municipal wastewater

treatment plants

There is no official translation of JS 202/2007 to English S

Sludge: JS1145/1996 on “Uses of Sludge in Agriculture” describes sludge treatment methods and presents sludge quality standards for reuse in agriculture (see full standards in Appendix B).

Other Standards

There are also several other Jordanian regulation, guidelines and standards pertinent to the EIA

Air Quality Standards

1. Jordan Ambient Air Quality Standards (JS: 1140/2006).
2. Maximum Allowable Limits of Air Pollutants Emitted from the Stationary Sources (JS: 1189/1999).

Water Quality Standards

3. Jordanian Standards for Treated Domestic Wastewater (JS: 893/2006).
4. Jordanian Drinking Water Standards (JS: 286/2001).
5. Jordanian Standards for Industrial Wastewater (JS: 202/1990).

General Environmental Law and Regulations

6. Environmental Protection Law (No. 52, 2006).
7. The Antiquities Law (No. 21, 1988).
8. Regulations for Protection of Birds and Wildlife and Rules Governing their Hunting (Regulation No. 113, 1973).
9. Public Health Law (No. 54, 2002).
10. Guidelines for Prevention of Noise, 1997.
11. Water Authority Law (No. 18, 1988).
12. Agricultural Law (No. 44, 2002).
13. Penalty Law (No. 16, 1960).
14. Civil Defense Law (No. 12, 1959).
15. Natural Resources Organization Law (No. 12, 1968).
16. Towns and Villages Law (No. 18, 1988).
17. Administration of the Ministry of Energy and Mineral Resources Act (No. 26, 1985).
18. Traffic Law (No. 47, 2001).
19. Labor Law (No. 8, 1996 as amended).
20. Social Security Law (No. 19, 2001)
21. Investment Law (No. 68, 2003).
22. Municipality Law (No. 55, 1954).
23. Administration of Public Property Law (No. 17, 1974)
24. Regulations No. (1) for the year 2006: Instructions for the elimination of unsanitary occurrences related to health harms generated from workers communities residential units.
25. JS 286: 2001 – Drinking water standards
26. JS 431: 1985 - Storage precautionary requirements for storage of hazardous material
27. JS 1140: 1996 – Ambient air quality (aimed at industries)
28. JS1052, 1053 and 1054: 1998 and JS 703: 1990 - Motor vehicle emissions
29. JS 1059: 1998 - Motor vehicles noise levels
30. JS 1401 and 1404: 1998 - Environment management systems

31. JS 1411 and 1412: 1998 - Guidelines for environment auditing
32. JS 525: 1997 - Heat levels allowed to be exposed to in the work environment
33. JS 524: 1987 - Lighting levels in work environment

Summary of responsibilities of some relevant regulatory authorities

Authority	Responsibility
Ministry of Environment	• Ministry of Environment (MoEnv) was established in 2003 to replace administratively the General Corporation for Environment Protection. • MoEnv has an authority to prepare the environmental by-laws, regulations, directives and guidelines. MoEnv in coordination with other concerned authorities establishes a policy for environmental protection and elucidates the strategy for its implementation. • MoEnv has issued EIA by-law (No. 37, 2005) which includes the procedures for conducting EIA in Jordan and also gives MoEnv the responsibility to provide/review/approve terms of reference and review EIA study reports. Article 13 of the Environmental Protection Law for 2006, empowers the Ministry of Environment to ask any new establishment that has potential impacts on environment to prepare an EIA study. • The EIA Directorate in the Ministry is responsible for licensing of the projects. The projects are referred to the EIA Directorate, and submitted to a Central Licensing Committee that consists of representatives of the relevant governmental authorities such as Ministries of Environment, Health, Water and Agriculture. An approval from the committee is required for licensing, which may have conditions attached to it, before the relevant authorities can grant permission. • Permitting prior to operation (EIA report is required). • Inspection during operation.
Ministry of Labor	• Permitting prior to operation (after the occupational health and safety measures are considered). • Inspection during operation.
Ministry of Health	• The Ministry is represented by Health Directorates in the governorates, which have the responsibility to follow up health matters in industries as well as among the public. • The Environmental Health Directorate has also the responsibility to check on the compliance of all industries with the health protection requirements. Disease Prevention and Safety Directorate, Occupational Health Division conduct periodical inspection programs on all industries in Jordan. • Inspection during operation.
Water Authority	• According to the Water Authority Law No. 18, 1988, WAJ is responsible for water distribution network in the Kingdom and supplying projects with the required quantity of water needed. Additionally, WAJ is responsible for monitoring water quality (surface and ground water and industrial discharges). • Permitting prior to construction (identification of intersection with water piping distribution system).

	• Supplying water needs for the project.
Department of Antiquities	• The Law of Antiquities (No. 21, 1988) calls for immediate reporting of any found remains. The Department then has the right to assess the significance of any discovered remains/antiquities and puts its recommendations accordingly. • Permitting in case of existence of Archaeological remains (EIA report would be needed).
Ministry of Energy and Mineral Resources	• Permitting of the exploration and mining activities. • Supplying electricity needs for the project.
Natural Resources Authority	• Natural Resources Authority (NRA) was established in 1965 under Law No. 12 of Regulating of the Natural Resources, which belongs administratively to the Ministry of Energy and Mineral Resources. The major responsibility of NRA is to issue the permits and licenses for prospecting explorations, mining and quarrying and mineral rights certificates.
Civil Defense	• Civil Defense Directorate grants approval on safety measures for industries and projects including emergency plan, occupational health and safety plans, and storage and handling of hazardous materials. The Directorate issues its final approval after an inspection visit has taken place to the project facilities to ensure conformity with the set requirements. • Approval for construction plans. • Permitting prior to operation.
Ministry of Housing and Public Works	• Permitting prior to construction.
Ministry of Industry and Trade	• Permitting prior to construction.
Public Security Directorate	• Permitting prior to construction.
Department of Land and Survey	• Permitting prior to construction.

International environmental agreements

Title	Signature
International plant protection convention	24/4/70
Protocol to amend the convention on wetlands of international importance especially as waterfowl habitat (RAMSAR)	15/3/84
Convention concerning the protection of the world cultural on natural heritage.	5/5/75
Convention on international trade in endangered species of wild fauna and flora.	8/1/81
Convention on biological diversity.	11/6/96
Convention on combating desertification	1996
Kyoto protocol on climate change	2003

Monitoring and Surveillance and Risk Assessment

The MOE Law, WAJ Law, and MOH Law all assign their respective institutions with responsibility for water and wastewater quality monitoring. MOE is concerned with environmental protection to ensure public health and long-term environmental sustainability. WAJ is most concerned with protecting water resources, also for public health. Public health concerns are a primary concern of the MOH, and its focus is mainly on

testing of microbiological parameters. The MOH and WAJ communicate and coordinate closely on monitoring and surveillance plans, results and responses to those results. The MOH can take appropriate action in relation to wastewater treatment plant operated by WAJ or any of its water company agents (i.e., LEMA or Aqaba Water Company-(AWC) for Wadi Mousa WWTP and reuse if needed.

They can also close down any private plants it deems are a danger to public health. In practice, WAJ monitors wastewater treatment plants connected to the sewer system. For those who recycle their own wastewater, monitoring levels depend on perceived risk.

D. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

A Monitoring & Evaluation system would be used to keep track of project progress compilation of data and information, tracking and dissemination of project outcomes and outputs, experiences and insights to all stakeholders.

The establishment of M&E systems for relevant outputs/activities is of paramount importance for effective knowledge management and sharing. Based on MOPIC's experience from community-based adaptation projects, presentation of concrete/tangible benefits (in terms of, for example, increased available quantities of water though wastewater reuse , increased farmer income, reduced harvest losses) in a way that is easy to understand by community members is often one of the most effective means for upscaling and replication.

Also investing in a robust and systematic M&E framework at the beginning of the project has a significant efficiency and effectiveness gain in the knowledge management within the project. Using M&E tools, throughout execution of the project, lessons learned will be captured, codified and discussed among stakeholders. This M&E framework will enable a production of technical reports from each of the technical Outputs, which will be collated as "best practice guidance materials and tools". Periodic project briefs, annual progress reports, midterm evaluation and final evaluation results will be circulated widely for review.

Gender Integration and Impacts will be an integral part of the M&E system and project activities the project will be actively recruiting women professional staff in both technical and administrative roles. Project activities will definitely 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 pilot field workers. As Gender is a crosscutting issue, and among the stakeholders in the projects,. Some of the major gender-impact issues that will be addressed in the context of the capacity building, climate change adaptation and development work relate to:

1. The extent to which women will be affected by the project activities.
2. The extent to which women will be affected by intensified production, considering changes in labor requirements, 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 engaged in activities at the project sites.
4. As the project pilots and activities develop and expand, continuously involving both male and female community beneficiaries in the design work and in decisions regarding infrastructure design and placement.
5. Development of public awareness and social marketing tools directed to both men and women recognizing that some of the tools may need to be tailored to the specific sub-audience groups.

The project would introduce a gender disaggregated system of data collection and reporting for each project component. The system would be designed to capture the rate of implementation against planned targets and objectives, as set out by the project design. The M&E plan would also track: (i) the financial management system (FMO) and information t;(ii) recording and reporting of progress against planned project targets; and (iii) the assessment of the impact of project activities on the target groups, stakeholder, community based livelihoods and their adaptation to climate change.

The PMU will be the entity responsible for reporting on the Monitoring and Evaluation of the project achievements and knowledge management. Standard format for a project M&E matrix and performance checklist aligned with indicators, baseline data, methods for data collection, synthesis and a communication strategy for lessons learned will be utilized. MOPIC is familiar with this role through their work with donor lender agencies and projects/programs monitoring.

Updating , continuous feed in and tracking and validation of benchmark data (disaggregated by poverty pockets, livelihood group, resilience, and gender integration) will take place with the key

M &E activities relying on the original approved project design and baseline data and surveys , continuous updates of data and achievements will be tracked with each implementing or partner agency reporting the findings of the monitoring exercise; annual impact assessment and evaluations submitted as per the AF regulations; a midterm review; and a final completion report based on assessment.

The M&E reports will be always be linked to the project rationale, log frame, annual work plans and budgets and the beneficiary assessments. The findings of the M&E will be used to take corrective or enhancing measures at the level of project management.

M&E Data collection responsibilities and flow:

The budget for the Monitoring & Evaluation plan is presented in the table below **to be covered by MOPIC as in kind contribution through the EPP Unit staff:**

- **Each executing entity appoints an M&E person** for data collection from sub projects it is overseeing their execution.
- **Each sub project assigns a field staff person to collect** data and assist in surveys to pass to executing entity M&E specialist
- **PMU will appoint a senior manager for M&E to collate data and survey results** from executing entities and prepare reports to PMU National Project Coordinator and TWG . This manager prepares M&E reports for review and approval to be sent to AF Secretariat.

The project will be monitored through the following M& E activities. The M&E budget is provided in the table below. The M&E framework set out in the Project Results Framework in Part III, Section D of this project document will be adhered to.

The key M&E project activities are:

Project Inception Workshop

A Project Inception Workshop will be conducted within one month of project start up/ It will be held within the first 2 months of project start up with those having assigned roles in the project organization structure, MOPIC, GOJ officials and regional heads of the WUAs and technical policy and program advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan. It will lay out project activities (modalities of project implementation and execution) and desired results and to plan the first year annual work plan. The Inception Workshop will address a number of key issues including:

a) Assist all partners to fully understand and take ownership of the project; Detail the roles, support services and complementary responsibilities of project team; Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.

b) Based on the project results framework set out in Part III, Section D of this project document, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.

c) Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
d) Discuss financial reporting procedures and obligations, and arrangements for annual audit.
e) Plan and schedule public briefing meetings. The first PB meeting should be held within the first 12 months following the inception workshop.

Following the Inception Workshop, an **Inception Report** will be prepared as a key reference document. The Inception Report will serve as an Annex to the signed project document and shared with participants to formalize various agreements and plans decided during the meeting. The Inception Workshop Report will be prepared and shared with participants.

Reporting

Quarterly Progress, Semi-annual and Annual Project Reports will be prepared by the PMU and approved by the NSC to monitor progress during the reporting period. These reports include, but are not limited to, reporting on the following:

- Progress made toward objectives , and outcomes verified by data and indicators
- Project outputs delivered per project outcome (annual);
- Lessons learned/good practices;
- Annual Audited Financial Expenditure Report;
- Risk analysis and management.

Quarterly Reports: Project progress will be monitored through the MOPIC and the NSC. Based on the initial risk analysis submitted, a risk log will be regularly updated. Risks become critical when the impact and probability are high (more than 50%).

Annually: Annual ***Project Performance Report*** **(PPR)** is an extensive key report which is prepared to monitor progress made since project start and in particular for the previous reporting period (on a rolling basis). An external consultant appointed by MOPIC PMU will assess the quality of PPR , reviews all PPRs prepared by MOPIC-supported adaptation projects for completeness, comprehensiveness, analytical rigor and lessons learned.

The PPR includes, but is not limited to, reporting on the following: (a) Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative); (b) Project outputs delivered per project outcome (annual); (c) Lesson learned/good practice; (d) AWP and other expenditure reports; (e) Risk and adaptive management; (f) Portfolio level indicators are used by most focal areas on an annual basis as well.

Periodic Monitoring through site visits:

MOPIC PMU will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Members of the Project Steering Committee and Technical Working Group (TWG) will join these visits as required.

Responsible Government authorities, including interested scientific research organizations and institutions, as well as donor/lender agencies will be granted the chance to conduct regular field visits to project sites for demonstration, documentation and feedback. A Field Visit Report/ will be prepared by PMU for circulation no less than one month after the visit to the project team and PSC members.

Mid-term of project cycle: The project will undergo an independent Mid-Term Review at the mid-point of project implementation. The Mid-Term Review will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation, and provide an independent review of MOPIC's role as an Executing Entity for this project. The Mid-term Review will highlight issues requiring decisions and actions and present initial lessons learned about project design, implementation and management to the NSC. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term Review will be prepared by the MOPIC PMU in partnership with the Government
.

End of Project: An independent Terminal Evaluation will take place three months prior to the final NSC meeting. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. It will also include an independent review of project implementation arrangements and their efficacy. The Terms of Reference for this evaluation will be prepared by the MOPIC PMU. During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (Objectives, Outcomes, Outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

External Evaluations

The project will undergo an independent external Mid-Term Evaluation to determine progress towards the achievement of outcomes and identify course correction if needed. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the projects term. A Final External Evaluation will be conducted 3 months before project close out. The external evaluations would be carried out based on terms of reference prepared

by the Government, and approved by AF.

Learning and knowledge sharing: Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Finally, there will be a two-way flow of information between this project and other projects of a similar focus.

Financial Reporting

The provision of Certified Periodic Financial Statements, and with an Annual Audit Report from a certified audit firm in relation to the financial statements relating to the status of project funds according to the established procedures will be the responsibility of MOPIC PMU.

Audit: Project will be audited in accordance with GOJ Financial Regulations and Rules and applicable audit policies.

M&E schedule, budget and roles.

Note this budget will be used to conduct workshops that lead to data generation and collation of baseline and progress data and beneficiary survey to be included in the M&E reports and results

M&E Activity	Responsibility	Role of of executing entities in M&E	Budget (USD)	Timeframe
Inception workshop - 2500	PMU – MoA	▪ Each sub project will assign a Field staff to collect data for reporting and surveys requested by executing entity M&E focal point. ▪ Executing entity Focal Points Report to PMU (MOPIC) senior M&E specialist who reviews data for indicators & Outcomes, progress reports	3000	first month of start date
Quarterly report	PMU		1000	Every 3 Months
Annual reports	PMU		2000	Every Year
Mid-term Evaluation	PMU		3000	End of 2nd Year of implementation
Final Evaluation	PMU and external evaluator		10000	Within last two months of the project
Final completion report	PMU		---	By the end date of the project
Field visits	GOJ agencies, research institutions and donor/lender groups, i.e executing entities		5000	Quarterly and upon need or request
Audit	Executing entities		5000	After operational closure of the project
Total Indicative Cost	**29000**			

- TWG: Technical Working Group.

E. Include a results framework for the project proposal, including milestones, targets and indicators.

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)*				
Sub-Component (A): Climate change adaptation of water Sector ***"Reuse of treated wastewater"*** (project **1.1, 1.2, 1.3, 1.4**):				
Projects Outcome	Core Outcome Indicator	Baseline	Mile Stone	project/Target/2019
Increased water availability and efficient use through wastewater reuse & water	**Quantity (m3) of Supplementary water available for agriculture, or number of families benefiting from the project**	**(1.1) 1,022,000 MCM**	**1,379,700**	**715,400 M3**
		(1.2) 17 MCM	**18.5 MCM**	**20 MCM/ Year**
		(1.1) 0	**219,000 M3/Year**	**438,000 M3/Year**
		(1.4) 0	**219,000 M3/Year**	**438,000 M3/ Year**
		Total for projects (1.1, 1.2, 1.3, 1.4):= 18,022,000 MCM	**Total= 20,317,700 MCM**	**Total = 21,591,400 MCM**
Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	**Increased income, or avoided decrease in income**	**(1.1) $398 /household/ month**	**$602 /household/month**	**$806 /household/month**
		(1.2) $ 170 /household/month	**$250 / household/month**	**$330 / household/month**
		(1.3) 0	**$150 /household/month**	**$300 / household/month**
		(1.4) 0	**$150 /household/month**	**$300 / household/month**
	Number of beneficiaries **Average family size is 6** **(2 Females, 4 Males) benefit &participate in project activities**	**(1.1) 40 family**	**55 Family"330" (220 Male, 110 Female)**	**70 Family "420" (280 Male, 140 Female)**
		(1.2) 16 Family	**23 Family "138" (92 Male,46 Female)**	**30 Family (180) (60 Female, 120 Male)**

		(1.3) 0	35 Family "210" (140 Male, 70 Female	70 Family "420" (280 Male, 140 Female)
		1.4 0	35 Family "210" (140 Male, 70 Female)	70 Family "420" (280 Male, 140 Female)

Sub-Component (B): **Climate change adaptation of Agricultural Sector through *rainwater harvesting& Permaculture*, *Projects "1.5,1.6")***				
Projects Outcome	Core Outcome Indicator	Baseline	MileStone	project/Target/2019
Increased water availability and efficient use through Rianwater Harvesting	**Quantity (m3) of Supplementary Fresh water available for agriculture,**	(1.5) 0	150,000 M3/Year	300,000 M3/Year
Increased adaptive capacity within relevant development and natural resource sectors	**Natural Assets Protected or Rehabilitated**	(1.6) 0	24 Farm	48 Farm
Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	**Increased income, or avoided decrease in income**	(1.5) 0	$1000 Farm/ Year	$2000 Farm/ Year
		(1.6) 0	$2500/ Farm/ Year	$5000/ Farm/ Year
	Number of beneficiaries **Average family size is 6** **(2 Females, 4 Males) benefit &participate in project activities**	(1.5) 0	205 Family "1230" (820 Male, 410 Female)	410 Family "2460" (1640 Male, 820 Female)
		(1.6) 0	190 Family "1140" (760 Male, 380 Female)	380 Family "2280" (1520 Male, 760 Female)

Component 2: Climate Change Adaptation Capacity Building, Knowledge Dissemination, Policy and Legislation Mainstreaming (projects "2.1","2.2""2.3"				
Projects Outcome	Core Outcome Indicator	Baseline	Mile Stone	project/Target/2019
Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	Number of Targeted population groups aware of Climate change risks on natural resources and the ecosystem.	**(2.1) 0** **assume each WUA has around 80 member, around 17% are women**	**24 WUA "1920"** **(326 Female, 1593 Male)**	**48 WUA "3840"** **(3187 Male ,653 Female**
Increased ecosystem resilience in response to climate change and variability-induced stress	Number of registered farmers in the Jordan valley will be registered users in the System Database	**(2.2) 16 WUA (assume each WUA has around 80 member, around 17% are women& 26 Farmer family (each family has 6 members,2 women& Men)**	**23 WUA "1840" (312 Female, Male 1528)** **& 33 Farmer Family "198" (132 Male , 66 Female)**	**30 WUA "2400" (1992 Male , 408 Female)** **& 40 Farmers Family "240" (160 Male ,80 Female)**
	Early Warning Systems installed	**(2.2) 0**	**1**	**3**
	Number of new micro-enterprises created linked to Agribusiness Industries	**(2.3) 0**	**150**	**300**
	Number of New direct& indirect Jobs related to Agribusiness in Jordan Valley	**(2.3) 0**	**9000 Jobs (2700 for Females, 6300 Males)**	**18,000 Jobs (5400 for Females, 14400 Males)**

F. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund

Alignment of Project Objectives/Outcomes with Adaptation Fund Results Framework

Project Objective(s)	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)*.				
▪ Limit 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.	➢ Quantity (m3) ofSupplementary water available for agriculture as a result of wastewater reuse	**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	4,900,000.019
▪ 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	1,000,000
		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.				

Project Objective(s)	Project Objective Indicator(s)	Fund Outcome	Fund Outcome Indicator	Grant Amount (USD)
▪ Strengthened Percentage of targeted poor communities to make informed decisions about climate change-driven hazards affecting their specific locations	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.	awareness and ownership of adaptation and climate risk population aware of predicted adverse impacts reduction processes at local level	of climate change, and of appropriate responses **3.2**. Modification in behavior of targeted population	200,000
▪ 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	550,000
▪ 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	

Project Outcome(s)	Project Outcome Indicator(s)	Fund Output	Fund Output Indicator	Grant Amount (USD)
Component 1				
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.	***Output 1:*** Risk and vulnerability assessments conducted and updated at a national level ***Output 2.1***: Strengthened capacity of **1.1**. vulnerability assessments No. and type of projects that conduct and update risk and national and regional centers 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	**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	4,900,000.019
Raise living standards of vulnerable remote poor communities.	Amount of Vegetable produced in (Kg / Year) Number of poor smallholder households whose lively hoodsfrom agriculture has been increased.	***Output 6:***Targeted individual and community livelihood strategies **6.1.1**.No. and type of adaptation assets (physical as well as knowledge) created in strengthened	support of individual- or community-livelihood strategies **6.1.2**. Type of income sources for households generated under climate change scenario	1000,000

		in relation to climate change impacts, including variability		
Component 2				
▪ 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 Number of new micro-enterprises created linked to the agribusiness industries.	***Output 3***: Targeted population groups participating in adaptation & **3.1.1** No. and type of risk reduction actions or strategies introduced at local level risk reduction awareness activities	**1.2** Development of early warning systems **2.1.1**. No. of staff trained to respond to, and mitigate impacts of, climate-related events **3.1.2**No. of news outlets in the local press and media that have covered the topic	750,000
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	

G. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

Breakdown of Project Execution Cost:

Item	Unit Cost (USD) /month	Units	Total (USD)
PMU Office Rent AND Utilities	**-**	**-**	**In-kind contribution by MOPIC**
Four staff members of EPP to work full time on the project including an M&E Specialist	**-**	**-**	**In-kind contribution by MOPIC**
Project Coordinator	**3100**	**48**	**148,800**
Administrative Officer	**1370**	**41**	**56,170**
Monitoring and evaluation and communication Officer	**1750**	**20**	**35,000**
Technical Experts (2 experts one ww reuse irrigation and one agricultural expert)	**4400**	**42**	**184,800**
Technical Expert (CIIP and Institutional Support)	**4400**	**42**	**184,800**
Mid-term Evaluation 1	**1**	**13,000**	**13,000**
Final Evaluation	**1**	**16,000**	**16,000**
IT equipment	**1**	**9,976**	**9,976**
Stationary and supplies	**249**	**46**	**11,454**
Travel to project field sites	**500**	**46**	**23,000**
Project Vehicle	**20000**	**1**	**20,000**

Project Cycle Management Fee charged by the Implementing Entity (IE) (@8.5%)

USD 723,000

Project Cycle Management Fee over 4y	% of 723,000	Amount
1.Development and Preparation	**20**	**144,600**

2. Overall Coordination and Management	**30**	**216,900**
3. Financial Management and Legal support	**20**	**144,600**
4. Evaluation and Knowledge Management support including Reporting	**20**	**144,600**
5. Overall Administration and support costs	**10**	**72,300**
Total	**100**	**723,000**

Break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function. **MOPIC as executing entity will utilize these funds for its role in project coordination, PMU hosting, thematic evaluations, knowledge management and dissemination and results publication**

IE Fees Breakdown of M&E Supervision	**Responsibility**	**Budget (USD)**	**Time Frame**
Field Visits of Programme Monitoring Specialists	**MOPIC**	**20000**	**Bi Annually**
Training workshops on M&E	**Specialized Firm**	**20000**	**January 2015**
Thematic Evaluations	**Specialized local firm/consultants**	**20000**	**Annually**
Mid Term Evaluation	**Specialized local firm/consultants**	**13000**	**December 2016**
Final Evaluation	**Specialized local firm**	**16000**	**April 2019**
Knowledge management activities and publications	**Royal Scientific Society**	**30600**	**Bi Annually**
Total Indicative Cost		**144,600**	

G. H. Include a disbursement schedule with time-bound milestones

DISBURSEMENT MATRIX

	1st disbursement - Upon agreement signature	**2nd Disbursement upon submission and AF acceptance of the first annual report and M&E plan**	**3rd Disbursement upon submission and acceptance of AF of first midterm report and progress**	**4th Disbursement Disbursement upon submission of draft final report and draft final M&E report**	**Total**
Scheduled	**30 Dec 14**	**30 Dec 15**	**15 Dec 16**	**15 Dec 17**	**4 Years**

Date					
Project Funds (USD)	**1,719,027**	**2,618,550**	**2,349,738**	**1,815,685**	**8,503,000**
Implementing Entity Fee (USD)	**146,166**	**222,648**	**199,795**	**154,389**	**723,000**

Below is a table with detailed budget with budget output notes, and an explanation and a breakdown of the execution costs

List of Proposed Project Execution Activities	Output of the Execution Activities with disbursement schedule with time-bound milestones	USD Amount
1) Climate change adaptation of Agricultural & water Sector through Technology Transfer (***The use of Non-conventional water resources (Reuse of treated wastewater & rainwater harvesting)***	**1.** Securing 18,531,955m^3 / Year amount of high quality treated wastewater by January 2019	4,272,882.019
	2. Securing 1200,000 m^3 amount of Rainwater harvested for poverty pockets (Southern JV) and local community groups by January 2019.	627,118
	3. Providing 22,322 Ton/year of fresh vegetables through Perma-culture projects in the Jordan Valley by January 2019	1000,000
2) Capacity Building at both the national and local/community levels respectively, knowledge Dissemination, policy and legislation mainstreaming.	Number of entities receiving advisory on Climate Change adaptation & Number of community outreach, workshops, training events, seminars, conferences, etc. by June 2017 Number of standards & policies reviewed & amended in support of climate change adaptation by June 2018 Percent increase in Agribusiness exports per year by December 2017 Percent increase in Private Sector savings in Agribusiness sector by December 2017	**1,900,000**
Project/Programme Execution cost		**703,000**
Total Project Formulation Grant		**8,503,000**

Below is a breakdown of individual projects budget.

Note: Execution Entities costs will be covered from their own government set budgets. Execution entities will be indirectly benfiting from the project activities and the support they will be providing to their constituencies and beneficiaries, as this is part of their operational mandates , thus they will not be charging for execution costs. Noting that labor operational costs were estimated under each project to cover the indirect execution cost.

Total estimated costs for proposed Activities for Project (1.1) for Wadi Mousa including operational costs

Type of Activity	Total Cost ($)
General infrastructure and Maintenance needs of the WWTP	36,723.16
Maintenance for the existing 50 Dunums cultivated with Barseem	40,254.23
Cultivating 100 new dunums with Berseem inside the lands of the first project	72,740.11
Expansion of the Project Area	115,819.2
Livestock Breeding	142,923.72
Beekeeping and honey production facility	61,680.79
Irrigation System Rehabilitation	64,950.56
Cultivation of Native Trees along the road to the WWTP	83,333.33
Plantation of Medical Plants Aloe Vera & Gel extraction plant*	46,610.16
converting green fodder into silage plant	53,672.316
Converting produced fodder into feed grains	91,807.90
Dairy Products Plant small sized	141,242.93
Aloe Vera Plantation pilot set up and Production plant	400,000
Total Investment cost of all projects	1,351,758.47
Annual Operational cost for labor	95,175.8
Four years operational costs	380,703.2
Total for Wadi Mousa including operational costs	1,732,461.6

***: Aloe Vera & Gel extraction plant** **Project needs:**

1- One Plastic house	13,000JD
2- Irrigation systems, JR 50 acres	15,000JD
3- Seeds	10,000 JD
Wastewater Irrigation system	140,000 JD
4-A factory for extracting gel	130,000JD

Total estimated costs for proposed activities project (1.2) for North Jordan Valley WW Reuse Project

Type of Activity	Total Cost ($) over 4 yrs
General rehabilitation and upgrading of on farm irrigation infrastructure and maintenance of the systems	120,000 JD
Install the best available technology of water filtration systems **(on a cost share basis by the farmers)**	250,000
Introduce water treatment and softening technology(ies) **(on a cost share basis by the farmers)**	250,000
Technical Assistance Support through: • 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 • A comprehensive soil survey is recommended in relation to soil quality, baseline data and soil salinity • Soil salinity management, and according to climatic data,	120,000
• 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 through.RSS, JFDA and JVA	250,000
Installation of new Irrigation System	**180,000**
Total Investment cost of all projects	**1,170,000**
Annual Operational cost for labor @10%	**N/A Borne by farmers as they are skilled farmers**
Total for North Jordan Valley ww reuse	**1,170,000**

Total estimated costs for proposed Activities for Tal El Mantah WWTP Reuse Project

Activities to be Implemented	Total Cost ($) over 4 yrs
Rehabilitation and maintenance of Tal El Mantah WWT plant*	183,615.819
The rehabilitation of the adjacent building to the WWTP to be used as a training center& lab testing	84,745.76
Total Investment cost of all activities	268,361.579
Installation of an irrigation system at the reuse land plot	258,192
WUA and local NGOs (women based ones) training on use of reclaimed water for agricultureal irrigation	100,000
Four years operational costs	213,866.84
Total for Tal El Mantah WWT project **including operational costs**	**840,420.419**

*: **Rehabilitation and maintenance needs of Tal El Mantah WWT plant to assure compliance with national standard 893/2006 for wastewater reuse in irrigated agriculture would require**

- Installation of a (2 Ton) Crane in the blowers room, and a 2 meter door
- Providing the requested spare parts as (Motor Gear for the precipitation pond, Extra Air compressor, a compressor for biological filter)
- Maintenance of the Electrical Boards.
- Cleaning of the flow equalization ponds ,
- Reduce the suspended matter in the aeration ponds ,
- Installation of a condenser to reduce the size of the sludge

Table (1.4-A): Total estimated Costs for Proposed Activities at North Shouneh WWTP

Type of Activity	Total Cost ($) over 4 yrs
Using TWW to irrigate stone fruit trees in and around residential areas	**130,000**
Install the best available technology of water filtration system to polish the effluent before distribution for reuse	**70,000**
Introduce water treatment and softening technology(ies) (on a cost share basis by the farmers)	**60,000**
Install on farm irrigation infrastructure for farmers in different locations around the vicinity of the pilot and surrounding farms **(on a cost share basis by the farmers)**	**80,000**
Technical Assistance Support through:	**70,000**

• Support the farmers in the northern Shouneh to adapt to new water quality (wastewater) 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 • A comprehensive soil survey is recommended in relation to soil quality, baseline data and soil salinity • Soil salinity management, and according to climatic data,	
• 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 through.RSS, JFDA and JVA	**20,000**
Project cost share for annual operational and labor costs over the four years at $25,000/Yr	100,000 Borne by farmers/WUA winning the contract advertised by JVA
Total for North **Shouneh WWTP**	**530,000**

Table (1.5-C): Total estimated costs for proposed Activities the W*ater harvesting Technologies in Poverty Pockets*

Type of Activity	Total Cost ($) over 4 yrs
Obtain rainfall data and rainwater harvesting potentials in the Mazraah/Haditha/Fifa region	40,000
Prepare engineering design and feasibility studies for potential earthern dams in region	40,000
Construction of a rainwater harvesting earthern dam in khanzeerah area	350,000
Training & Involving communities in planning and managing their watershed.	90,000
Water quality monitoring (both micro-biological as well as selected physio-chemical parameters) JVA	20,000
Install new irrigation and filtration systems on farms	150,000
4 yrs Operational cost	97,118
Total for water harvesting technologies in poverty pockets	**627,118**

Project Program Activities	Cost Per Person	# of courses given per Year	Estimated average number of participants	Total Estimated Cost (JD)/yr	Total Estimated Cost (JD)/4 yrs

Training on Subjects (1-16) " 5 days"	**400**	**3**	**17**	**20,400 JDs**	**81600**
Permaculture Design Certificate (17) "2 weeks"	**600**	**2**	**20**	**24000**	**96000**
2 permacultre Pilots one for the middle and North JV and one for the Fifa/Mazraah	**-**	**-**	**-**	**25,000 per pilot project**	**200,000**
Transformation of regular farms in JV into Permaculture Systems	**-**	**-**	**-**	**125,000**	**500,000**
Labour costs	**-**	**-**	**-**	**37,000**	**150,000**
Incidental equipment cost (project partial cost share)	**-**	**-**	**-**	**18,650**	**74,600**
Total Cost (JD)	**250,000 per yr**				**1,000,000**

Total estimated costs for proposed Activities

Total Estimated Implementation Cost of project (2.1) National Policy Capacity Building Needs for Climate Change Adaptation of Jordan's Agriculture Sector

- **200 000 USD**
  - **Awareness campaign 100,000 USD**
  - **Cost of SMS system creation and operation: 100,000 USD**

- **Total Estimated Implementation Cost of Project (2.2):** Using ICT as an enabling tool for more effective climate change adaptation and development programmes

  Total 550,000 USD:
  - 300 000 USD for the ICT work (Portal, 2way SMS and Mobile Application)
  - 100 000 USD for training of local community **(WUAs and farmers)**and SMS scientific content
  - 150 000 USD climate change early warning System "Irrigation Management Information System (IMIS)"

Budget Summary for project (2.3) Jordan Valley Water Forum Competitiveness Project:

Type of Activity	Total Cost ($) over 4 yrs
Consultant Fees	150,000
Workshops, training	140,000
Other cost: Technical Support and procurement support towards enhanced business modeling of WUAs and the establishment of a regional revolving fund with seed money	160,000
Four regional grading, packing and cold storage facilities	903,952 (**project cost share at $570,000)** remainder share by farmers through revolving fund loans)
Support for JFDA in ISO 17025 Accreditation towards A JVA Crop Certification Program	80,000
M&E Costs	**50,000**
Total Project Cost	**1,150,000**

ANNEX (1)

A. Reclaimed Water Distribution System in Wadi Mousa WW Reuse Project

A 1,700-m3 irrigation water storage pond is located within the WWTP boundary. There are two irrigation pumps and three sand filter units next to the irrigation pond. According to the drawings prepared by the Reuse for Agriculture, Industry and Landscaping Project (RIAL), the irrigation water conveyance main is a 350-mm ductile iron pipe. A 100-mm ductile iron pipe diverts part of the reclaimed water to the farm units next to the treatment plant and also for the irrigation of plants within the WWTP.

Reclaimed water is diverted to 63-mm high-density polyethylene (HDPE) sub-main lines leading to the irrigation head units and to each farm unit. Based on the field investigation conducted by the project team in 2011, the existing irrigation network for the water reuse pilot site consists of an underground 160-mm un-plasticized polyvinyl chloride (UPVC) main conveyance line, two 90-mm and 160-mm HDPE main lines conveying water to 41 farms, as well as farms' irrigation systems. The irrigation system at each farm includes a sub-main line, manifolds, laterals, and head units.

The original pilot project started with a 6.9-ha demonstration and was later extended to 36.9 ha during the WRIP period (Phase I area). The RIAL project added another 30 ha of irrigated area (Phase II area).

B: The General infrastructure and Maintenance needs of the site & detailed Budgets of Project (1.1)

The infrastructure of the project is consisted of a group of main irrigation ductile pipeline with diameter of 12 inches connected to ten distribution manholes feeding Polyethylene and UPVC sub laterals made from its diameter ranges from 100mm to 200mm. A main sand filtration and control units distribute wastewater to farms, this unit consists of: main control valve, pressure regulator, water meter, fertilizer injector and disc and filter.

The age of this infrastructure is ten years and it's still working but needs maintenance as follows:

Needed maintenances	Cost
1- Renewing the sand filter unit which is consisted of 3 tanks, the capacity of each one 2500 liters, it is locally manufactured from metal sheet with a group of valves (12 valve 3 inches and 3 valves 6 inches).	10000 JD
2- Maintenance of distribution manholes and the main valves	2000 JD
3- Replacement of irrigation mainlines	2000 JD
4- Replacement of all obsolete fertilizer injectors	4000 JD
5- Maintenance for pressure regulators	2000 JD
6- Replacement of irrigation meters / 20 meter	6000 JD
TOTAL	26000 JD

Maintenance for the existing 50 Dunums cultivated with Barseem

100 dunums have been maintained from total of 150 dunums cultivated and 50 dunums still need to be maintained, and they are distributed on the farmers' lands as four dunums for each farmer, as the beneficiary farmers are about 12.

Need	Cost
Barseem seeds (250 kg)	12500 JJD
Irrigation network GR for 50 Dunums	15000 JD
Parts and accessories	1000 JD
TOTAL	28500 JD

Cultivating 100 new dunums with Berseem inside the lands of the first project

Barseem is considered to have the highest cash benefit crop for the farmers, so there is a group of farmers who want to participate in the project by cultivating Barseem, they are already members in the Sad Ahmar Association and didn't Benefit from the project before, as the association will convert a part of the lands that are cultivated with the winter crops such as Barley to be cultivated with Barseem as barseem is more Income-generating, the beneficiaries of this activity are about 20 farmers by 5 dunums for each farmer and total area of 100 dunums.

Needs	Cost
Modifying the main irrigation lines	8000 JD
GR Irrigation networks	30000 JD
Modifying the control units	5000 JD
Irrigation Meters	6000 JD
Barseem seeds	2500 JD
Total	51500 JD

Expansion of the Project Area

As the result of the continual increase of available reclaimed water quantities year after year, its above mentioned elements would absorb the resultant wastewater quantities until early 2017 then an extension in farming would be needed to absorb the excess

water quantities. Based on the on the directives of the responsible government agencies PDTRA to expand towards lands owned by citizens nearby the WWTP site which has a total area of 350 dunums as a maximum and therefore no expansion area is available because this site is surrounded by mountains from all sides. There are locally owned lands divided into 30 pieces and all of its owners want to use the resultant water from the station, the extension must be in these lands with fruit trees cultivation only to so that not to compete the previous project on waste water consumption as the needs of this site (which one) of water range from 700-900 cubic meters daily only.

Needs	Cost
pumping unit (120m3/hour)	8000 JD
Sand filter unit (1020m3/hour)	4000 JD
Pipeline (diameter: 170mm – Polyethylene- length 2000m)	2000 JD
Control unit (fertilizer meter- main valve) / 30 unit	15000 JD
Irrigation networks – Polyethylene 350 Dunums (for trees)	35000 JD
Total	82000 JD

Technical Assistance Plan

The most critical part of the technical assistance is to build capacity for WUA and the farmers and support their effort to sustain the pilot technically and financially. Coordination with (PDTRA), is currently manages the whole of Petra Region, and other stakeholders is the first step. Other elements of the technical assistance, including trainings will follow, once responsibilities of stakeholders are clarified. A socioeconomic study will be conducted to evaluate the current socioeconomic status of the Wadi Mousa farmers and to monitor the success of the technical assistance.

The following technical assistance activities are proposed in this plan:

- Coordination with the Petra Development Tourism Region Authority (PDTRA) to supervise the pilot and the expansion plots areas PDTRA is the local Jordanian organization which assumes responsibility for supervising and managing the project, and the Project will coordinate with (PDTRA) for the technical assistance implementation
- Providing assistance to the management of the irrigation system operation and maintenance Farmers need more training and assistance in managing their on-farm irrigation activities including the management of their finance
- Development of Wadi Mousa project data base A database is needed to build up an information base for proper management and decision making of the project

- Providing technical assistance to improve cropping pattern and in particular those crops that can be irrigated with reclaimed water, drought resistance for climate change adaptation. Applying the right cropping pattern that suits not only the agricultural, economic, and environmental aspects of the area but also the natural habitat, social and cultural aspects
- Assisting farmers to improve the handling of agricultural products Proper handling of agricultural products affects the marketability of their products
- Training farmers and the Al-Sad Al- Ahmar WUA staff The training sessions will be developed in coordination with (PDTRA), and will help building the capacity for WUA and farmers to self-sustain the project
- Monitoring the socioeconomic status of reclaimed water users The socioeconomic study will monitor and evaluate the progress of the project and the results will be used for the climate change and adaptive management of the project
- Establishing fresh water access service. Fresh water should be used for the hygiene of the farmers and workers.
- Drip irrigation laterals are due to be replaced for the entire pilot project; however, the farmers were setting aside a portion of their income to cover replacement costs. The cost breakdown shown in this Annex. Covers 50 percent of the total cost to replace drip irrigation laterals and associated parts. The remaining 50 percent will be replaced gradually in coming years at the farmers' expense. In cooperation with (PDTRA), the project will help farmers (through the technical assistance and training) plan to set aside funds necessary to pay for irrigation system maintenance, repairs, and replacement based on each materials' expected useful life.
- The John Deere tractor must be replaced with a new tractor for which spare parts are readily accessible at local dealers. After consideration of farming practices in Wadi Mousa, the design team concurs with the farmers request for a model with greater than 75 horsepower. By purchasing the tractor, the farmers would pay significantly less, and the expected cost burden to the WUA will be similar or less than their expenses for machinery prior to 2011, when they did not incur a significant maintenance expense. Eliminating the immediate financial burden of the tractor maintenance and supporting the critical parts of the reclaimed water irrigation system rehabilitation should enable the WUA to retain the surplus in its account, from which they could pay for routine maintenance requirements.
- The proposed work also includes training of farmers and WUA members, and the costs associated with the preparation of training materials. Trainers' fees are included in the implementation cost.
- Build WUA's financial management capacity to set aside part of their income for maintenance, repair and replacement of the irrigation system in the future.

Providing assistance to the management of the irrigation system operation and maintenance

Technical assistance will be provided to build capacity for the farmers and the WUA to maintain best practices in the operation and maintenance of the reclaimed water irrigation system. The

first step to continue the pilot project is to identify and agree on the responsibilities of each stakeholder. Existing agreements will be revisited among the stakeholders with their responsibilities clearly defined. According to the WUA, farmers at the Wadi Mousa project agreed orally that they are responsible for the maintenance and rehabilitation of their on-farm irrigation systems. However, there is no written agreement between the farmers and the WUA or any other parties in this respect. It is preferred to develop a written agreement between the WUA and farmers regarding the responsibility and accountability for irrigation network maintenance inside and outside farmers' fields.

This effort will be led by (PDTRA), and the project team will facilitate the communication among the stakeholders. The activities needed include:

- Coordination with WAJ to implement the maintenance of the main conveyance lines transferring water to the project site
- Coordination with (PDTRA) and WUA to inventory routine maintenance parts and the items in Appendix B that were not covered under the estimated costs for a proposed external funding source
- Coordination with (PDTRA), WUA and farmers to implement the maintenance/rehabilitation work according to the budget and urgency of the work (Detailed records of the damaged or missing parts needed for rehabilitation of the irrigation network at each farm are found in Appendix B)
- Provide opportunities for the farmers and WUA to re-visit proper water management and the development of an irrigation schedule according to the requirements of the crops grown so as to avoid resource wastage through over irrigation. The activities will be identified through discussion with farmers and WUA.

The detailed Livestock information & Budget:

Neonatal Care (from birth to weaning)

- Custody of births (babies): Caring for newborns during the first hours of their life, & guide them to know their mothers, help them breath, warm them up and help them in breast feeding in addition to many other things.
- Breast Feeding: Lambs are fed by their mothers from birth to weaning, and this milk is the main source of nutrition for them for the first fifteen days in their life. Lambs can't withstand hunger, it might die if they stay without food, lambs must be taken care of especially specially during breast feeding. Special attention must be paid to abandoned lambs, also lambs that have infected mothers.
- Numbering of lambs: assigning a number to each lamb after castration process directly, usually when lamb's age is 14 days.
- Check up: After the processes of castration and numbering, Check up takes place for infections, constipation, diarrhea, or internal and external parasites.
- -Birth weaning: Babies are weaned when they 3-4 months old. When mother s wean their babies earlier it’s good for mothers to take rests from feeding babies , and get them ready in upcoming pollination season. Also there's a benefit for breeders that is to gain more amounts of milk.
- A three-week old lamb can eat foods gradually, the amount of food they eat increases while they grow up. Lambs are sold directly when they have been weaned or are involved in a fattening program especially for males to be ready for slaughter when they are sold.
- - Taking care of males (Rams) : They should be fed carefully in order not to be overweight , because obesity affects their fertility , and pay attention for their movements and sports ,males should be isolated from females (ewes) in non-reproduction season , their health should be monitored against internal and external parasites.

The process of milking and taking care of udders:

-Usually ewes milking done by hands in convertible barriers or wherever they are found, they are milked twice a day in morning and evening. Where breeders offer them food during milking processes, and they shouldn’t be annoyed during milking processes. The hands of the milkman and the surrounding area must be clean. Pay attention to any dust or wool that may fall in the milk. Additionally the hygiene & wellness of ewes must be cared for. Moving from one animal to another during the milking process must be avoided in order to prevent diseases. Milkman shall empty the udders completely, especially if the lambs are not fed by their mothers or mother’s milk is very heavy and thick.

- Fleecing: fleecing wool by hands using scissors or automatic fleecing. Sheep should be mowed once a year in a clean dry place. Extra attention should be given in order not to cut the sheep.

- Trimming the hooves: This is an important process for ewes and rams, in order to for them to walk normally and prevent any dirt to compile & cause any infection.

- Sheep Barns: The Barn should be easily accessed from the pasture, simplicity in design is requested, and additionally it must be established in a dry place. Noting that each ewe need from 1.2 to 1.5 m2, each lamb need from 0.5 to 0.7 m2. Moreover the design should also include an area for drinking and for the animal feed.

- Fattening Barns: It is usually open barns with sunshades, fattening barns extend from 1.5 to 2.5 m2 for each sheep, and 1/3 of this space must be provided by a shade.

- Dairy Barn: It is very important to maintain a clean and sterile area to produce clean milk. Ewes are usually milked manually in rows.

-Troughs: it's available in markets, and it's made of iron. The following standards should be considered: ease of access, easy to clean and food loss must be at its minimum. Every 20 Trough costs about 600 JDs.

-Water Stripes: The dimension of a strip is 3.6 m in length & 50 cm in width so that hundreds of sheep can drink alternately. Breeders must provide a clean source of water for sheep. Watering (drinking) stripes must be away from bush around 25-30 m, additionally water stripes must be cleaned and dirt removed constantly. The water stripes estimated price is 350 JD including building material & labor costs.

Variable costs

Type	**No.**	**Price JD/sheep**	**Total**
Ewes	200	250	50,000
Rams	20	250	5000
Total 55,000 JD			
Labor costs JD/per year for the first year only			
Type	**Number of labors**	**Monthly wage/JD**	**Annual wages/JD**
Labor	4	250	120,00
Total 12,000			
Fixed equipment costs			
Equipment	**Number of Equipment**	**Price JD/ unit**	**Costs JD**

Troughs	20	30	600
Cement watering Channel	1	350	350
Steel water tank	3	120	360
macerator with Mixer	1	4000	4000
Total			5310
Fixed Barn Costs			
Type	**Size m2**	**Unit costs JD /unit**	**Estimated costs**
Ewes Barns	300	11.16	3348
Fattening Barns	200	5.54	1108
Rams Barns	25	24.36	609
Fodder Storage	24	25,375	609
Maternity Barn	25	25,000	600
Land	5000	-	Available from Association
Administration caravan			3000
Total			**9274**

Type	Amount / no/tons	Price/unit	Estimated costs
Barley	27tons	175	4725
Bran	13tons	77	1001
Soya	4.5tons	450	2025
Trefoil	16tons	370	5920
Straw	16tons	190	3040
Salt	400kg	0.5	200
Salt blocks	60unit	3	180
Other elements	40	11,25	450
Water	For a year	2/year/sheep	420
Plastic Barrel	4 units	20	80
Plastic Bucket	5units	3	15
Muslin+ sterilizers	--	150/year	150
Antibiotics	--	500/year	500
Sponges +hormones	--	650/year	650
Plastic tarpaulin	Roll	250/year	250
Total			19606

Total: ((101,190)) JD

Cost for Purchasing a Tractor			
Advantage			**Disadvantage**
Ownership of an asset			Maintenance cost
Availability guaranteed			
No transportation needed			
Good maintenance could extend the useable years		Poor maintenance could shorten the usable years	
Lower cost burden for farmers; Potential additional income through renting to external farmers			Cost burden for WUA
Cost comparison			
Purchasing			
Initial cost (estimated average)	24,500		
Rent per hour (JOD)	0		
Use per year (hr)	1350		
Maintenance cost	10,200		
Annual cost to WUA	4,800		
Annual cost to farmers	5,400		

Technical Needs for dairy products plant.

Technical Staff Needs:

Project Manager	Ministry of Planning & International Cooperation	
Site manager	full time	Hiring
Assistant Agricultural Engineer at site	full time	Hiring
Engineer from PRA	part-time “A day per week “	Perta Region Authority
Livestock Engineer	part-time “2 days per week”	Ministry of Agriculture
Veterinarian	part-time “A day per week”	Ministry of Agriculture
Bees Engineer part-time“	A day per week	Ministry of Agriculture
(2) Technicians	full-time	Hiring
(6) Field workers	full-time	Hiring

Technical Advisors Needed:

Irrigation networks designer.
Livestock Breeding
Beekeeping
Feed manufacturing
Dairy manufacturing

B: Important nutritional and therapeutic benefits of bees products’: & Cost Break down

- Honey is a thick liquid with multi colors and flavors, it is used as food & drink and is fit to be a cure for many ailments.
- The Royal honey: Is considered as the second important product which is made by bees and fed to larvae bee workers and males for the first three days of development, it contains substances responsible for sexual development of the queens. The royal honey is very rich in vitamins, especially (vitamin B).
- Wax: it’s a very important, secreted by bee workers at the age between 12-18 days, and has its benefit in coloring, cosmetics and in curing sinus infection.
- Pollen: rich with protein about 25%, it also contains vitamin B and C, it’s used against aging and loss of appetite.

- Propels: A material that is collected by bee workers from the buds of some types of trees , and it is used as an antibiotic to stop the growth of bacteria and also used against poisoning.
- Bees poison: Is used in the treatment of arthritis and Rheumatism.

Members of Bee hives and their function:

-Queen bee's most important function is:

Laying eggs which are classified into two types:

A - Fertilized eggs which produces workers and queens

B - Unfertilized eggs which produce males

-Production of royal substance by the Queen that combine all the members together.

The Bee worker which is the smallest in size yet considered as the pillar of the beehives, as it has the most important job internally & externally where it undertakes the following tasks based on its age:

-

Day	Activity
1-3	Cleaning the Hexagonal cells from the bee workers remains
3-6	Feeding Old Bees with Honey & Pollen
6-11	Feeding queen and larvae with royal food
11-18	Wax production and storage of pollen
21-18	Guard the sect from any enemies
21-die	Collecting nectar, pollen, water and propels

3-Males:

Males are bigger than bee workers and shorter than the queen, and they doesn't have any bite to protect themselves, they only have to pollinate the queen.

Fixed costs:

Unit	No.	Price/unit	Estimated costs
Caravan and it's equipment	1	3000	3000
Sunshades	1	1200	1200
Honey Seperator	2	650	1300
Beehives and their parts	100	200	20000
Levers	10	10	100
Chimney	10	10	100
Fencing			5000
Total			30700

Variable assets costs:

Unit	No.	Price/unit	Estimated costs
Wax frames	2500	2	5000
Extra boxes	250	35	8750
Suits	10	50	500
Brusher	10	5	50
Borders for the queens	10	7	70
Total			**14,370**

Administrative and labor costs:

Type	No.	Wage/month JD	Annual wages
A technician for a year	1	300	3600
Total			3600

Total: 43,670 JD

C: Estimated Costs for Irrigation System Rehabilitation for Wadi Mousa Pilot Project

1. **Conveyance line from wastewater treatment plant to the pilot project area** Work on the pump station: supply, install, test and provide maintenance with all accessories necessary, complete as per specifications Work on the sand filters: maintain valves, paint, and install rubber to stop the leak from sand filters, and provide maintenance the concrete base with all accessories necessary to complete the work

ITEM DESCRIPTION	UNIT	QTY	Working Pressure (bar)	Material Origin	Unit Price J.D	Total Cost J.D
Pump station *One Vertical Multi-stage pump (Q=30 m3/hr@ 3.5 bar) * Variable speed, Variable frequency drive (VFD) * Electrical Control Panel and protections * Pressure Vessel 100L * Pressure transmitter * Piping * Valves * Strainer * Non-return valves * Fittings * All materials required to complete the works	No.	1	3.5	Denmark	6,200.00	6,200.00
Fix leakage for 6" valve	No.	1	Flange valve		75.00	75.00

Fix leakage for reducer 8"-6"	No.	1			75.00	75.00
Gasket for 8" flange valve	No.	1			50.00	50.00
Sand Filters						
Sand Filters	No.	3	epoxy coated		300.00	900.00

2. **Irrigation system sub-main to farms** Work on farm head units, valves and fittings: Supply, install, test and provide maintenance with all accessories necessary, complete as per specifications

ITEM DESCRIPTION	**UNIT**	**QTY**	**Working Pressure (bar)**	**Material Origin**	**Unit Price J.D**	**Total cost J.D**
Farm Head Unit						
3"- Flanged Flow meter	No.	15	10	China, Poland	320.00	4,800.00
3"- Disc filter	No.	23	20	KSA	250.00	5,750.00
3" - Pressure regulator	No.	11	20	Italy	650.00	7,150.00
1.5" - Venturi fertilizer	No.	14		USA	150.00	2,100.00
Cartridge (Disc) for 3" disc filter	No.	9		KSA	75.00	675.00
Accessories for 3" pressure regulator	No.	10		Local	20.00	200.00
Accessories for 1.5" Venturi fertilizer	No.	15		Italy	35.00	525.00
Pressure gauge	No.	84	20	Italy	9.00	756.00
Valves:						
4"- Flanged valve	No.	3	20	Italy	350.00	1,050.00
4" - Threaded valve	No.	1	20	Italy	150.00	150.00
3" - Flanged valve	No.	1	20	Italy	250.00	250.00
3"- Threaded valve	No.	6	20	Italy	75.00	450.00
Fittings						
Clamp saddle with reinforced ring 125* 2"	No.	1	16	KSA	6.50	6.50

PE Male adapter 90x3"	No.	9	16	KSA	8.50	76.50
PE Coupling 110mm	No.	2	16	KSA	23.00	46.00
PE Coupling 90mm	No.	2	16	KSA	15.00	30.00
PE Elbow 3"	No.	2	20	White Iron	25.00	50.00
Nipple 3"	No.	1	20	White Iron	25.00	25.00
Air release valve 2"	No.	1	10	KSA, Italy	50.00	50.00

3. **Farm units** Work on farm units: Supply, install, test and provide maintenance as per specifications and as shown on drawings, HDPE pipes (working pressure 16 bar) for irrigation system, pipes shall include all fittings such as elbows, tees, unions, adapters, reducers, "Y" connections and all accessories necessary to complete the work such as chasing, cutting, excavation and refilling. LDPE (working pressure 4 bar) polyethylene pipes with all accessories necessary to complete the work for irrigation laterals.

ITEM DESCRIPTION	**UNIT**	**QTY**	**Working Pressure (bar)**	**Material Origin**	**Unit Price J.D**	**Total cost J.D**
HDPE Pipes – Farms						
HDPE pipe ø 90 mm - 16 bar, Purple	M	250	16		5.50	1,375.00
LDPE Pipes – Farms						
LDPE pipe ø 20 mm - 4 bar 1.8 mm wall thickness, Purple	M	2000	4		0.14	280.00
LDPE pipe ø 20 mm - 4 bar inline emitter pipe GR, 12 lph/m, Purple	M	65200	4		0.18	11,736.00
Rubber 20mm	No.	2000			0.05	100.00
Elbow 20mm	No.	2000			0.05	100.00
Coupling 20mm	No.	2000			0.05	100.00
End plug 20mm	No.	2000			0.05	100.00
PE Male adapter 63x2"	No.	20	16	KSA	4.30	86.00
PE Male adapter 50x1.5"	No.	12	16	KSA	3.20	38.40
PE Elbow 63x2"	No.	20	16	KSA	6.50	130.00

ESTIMATED GRAND TOTAL FOR IRRIGATION SYSTEM REHABILITATION : 45,985 JOD Equivalent to ~USD 70,620

ANNEX (2): Stakeholders Consultations & Meetings

A: Project (1.1) Consultations at Wadi Mousa with Sad Ahmar Board of Directors on May 12, 2014

Minutes of meeting:
Date: (12th of May 2014)

- An initial consultation meeting was held by staff of sustainable Environment & Energy Solutions (SEES) and the steering committee (5 members " Men"who signatures exist in the arabic version) of Sad Al Ahmar society (WUA). The meeting aimed to document all the issues & requests related to Project (1.1).Following is a summary of the demands:

1) Implement new supporting projects as production of animal Feed.
2) Maintenance of current infrastructure for the project.
3) Support the (WUA) with income generating projects.
4) Activate the Revolving Fund
5) Implement specific project to Support Women.

Below is the sheet in Arabic of this Translation

بسم الله الرحمن الرحيم

محضر اجتماع

بتاريخ ١٢ / ٥ / ٢٠١٤ تم الاجتماع ما بين أعضاء هيئة الإدارة بجمعية السد الاحمر والسيد المهندس إسماعيل احمد الطويسي من شركة المستدامة لحلول البيئة والطاقة وسماع مقترحات الهيئة .

أسماء الهيئة

١- ت...

٢- س...

٣- عبـ...

٤- ع...

٥- ...

المقترحـ...

١- توسـ...

كميات...

تابع محضر اجتماع

٢- إقامة مشاريع مساندة لإنتاج الأعلاف (ثروة حيوانية) .

٣- صيانة البنية التحتية في المشروع .

٤- رفد الجمعية بمشاريع إنتاجية لزيادة دخل الجمعية .

٥- تفعيل وتشغيل الصندوق الدوار .

٦- عمل مشاريع للقطاع النسائي .

توقيع الهيئة الادارية .

علي ابراهيم العمارين رئيس الجمعية

سالم لافي العمارين السكرتير

عبد الله محمد العمارين المحاسب

عايد محمد العمارين امين الصندوق

حسين هارون الحسنات عضو

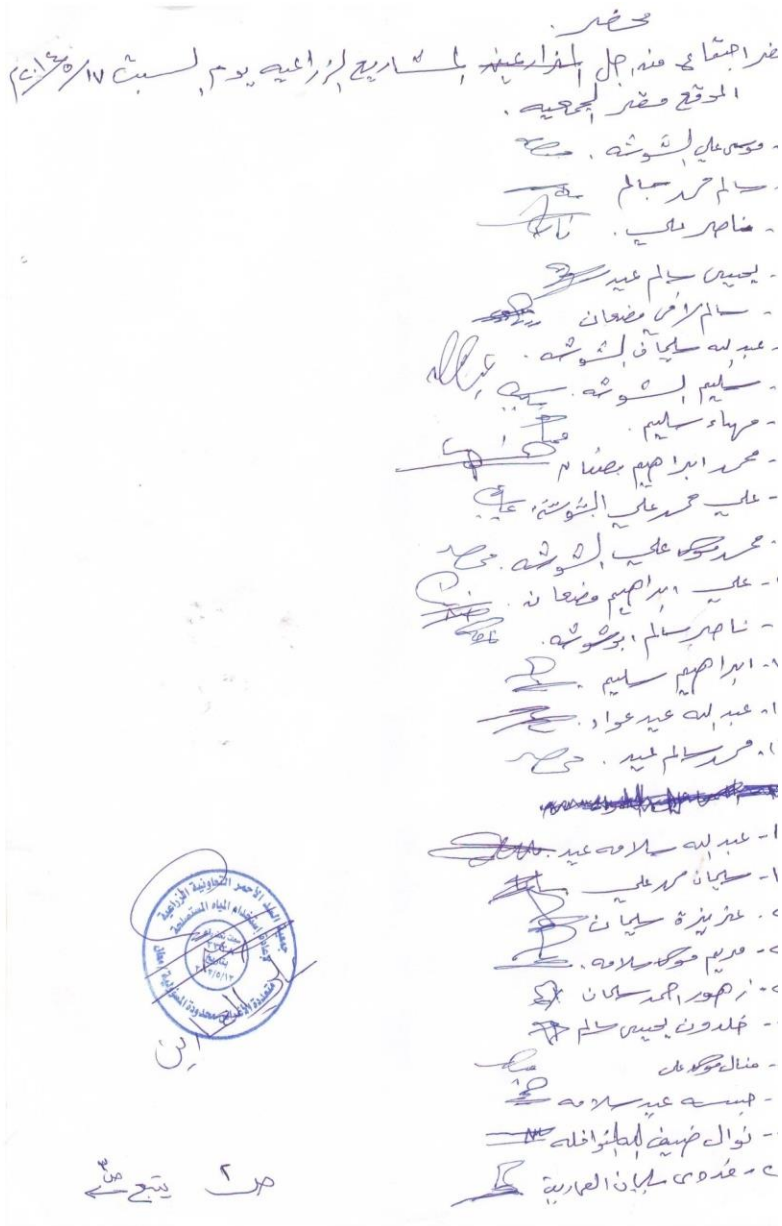
جمعية السد الأحمر التعاونية الزراعية لإعادة استخدام المياه المستصلحة متعددة الأغراض محدودة المسؤولية / معان
سجلت تحت رقم ٢٣٢٨ بتاريخ ٢٠٠٣/٥/١٣

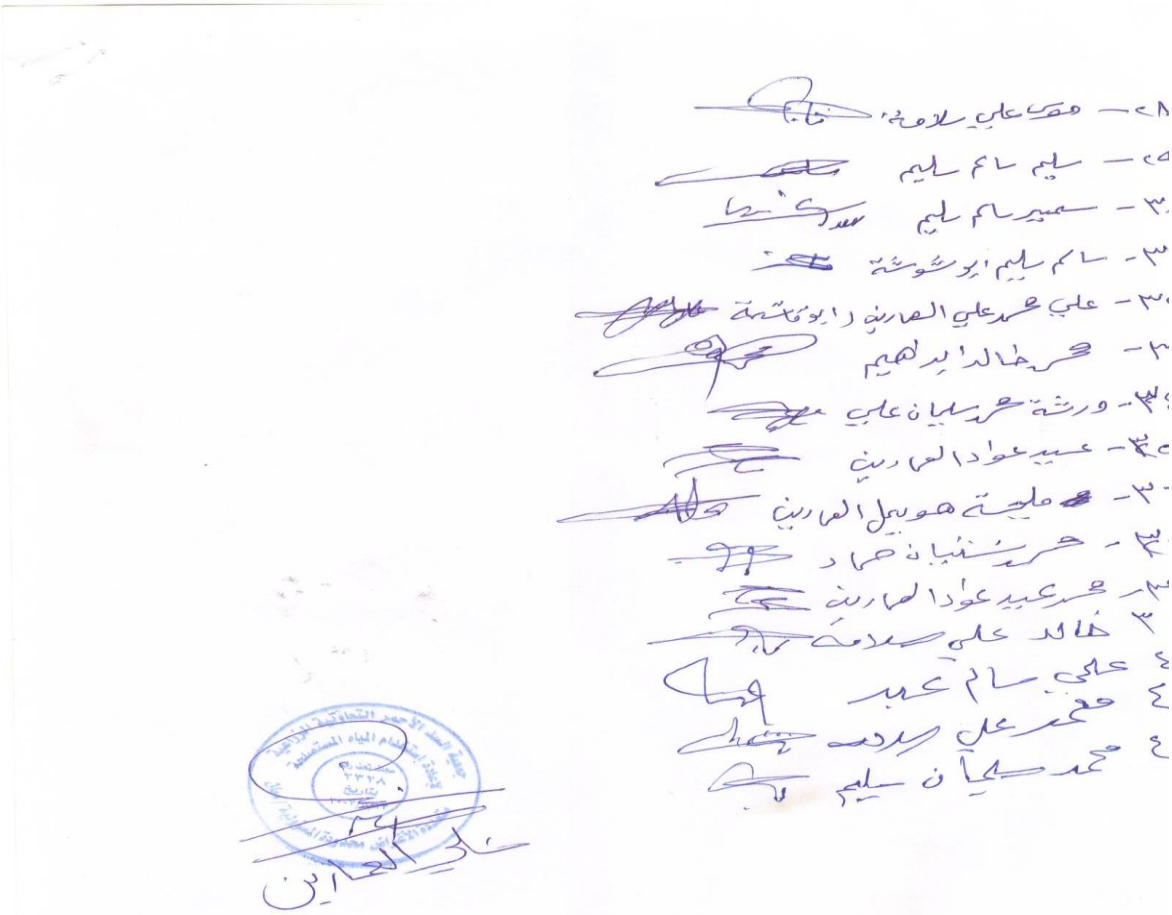
Sad Ahmar members Consultation at Wadi Mousa on May 17, 2014

Date: (17th of May 2014)

Another Meeting was held at Sad Al Ahmar society (WUA) in wadi Musa with members of the community to discuss agricultural projects. Around 41 persons from the local community attended this meeting; among these 31 were men & 10 women. Who signatures exist in the Arabic version below.

Below is the sheet in Arabic of this Translation





Stakeholders Consultations

On Sunday, 18/05/2014, 2:00pm

B: Jordan Valley Water Forum Steering Committee Consultation Meeting on May 18, 2014 This meeting include consultation for projects (1.2),(1.3),(1.4) & (1.5)

No.	Topic
1	Greeting of General Secretary of Jordan Valley Authority for the attendees
2	Presentations of the proposed project programs is as follows: -Hydroponics and compost -Tal-Al mantah WWTP. Project (1.3) -Reservoirs and desert ponds. (Water Harvesting 1.5) -Treated wastewater reuse in northern Jordan Valley. Project (1.2)
3	Other topics.

Meeting record (7)
The Directional Committee of the Forum on water in the Jordan Valley
Location: Meeting halls on the third floor
Date & Time: 05/18/2014 at 2:00

Attendance:

- **HE Secretary General of the Jordan Valley Authority Engineer Saad Abu Hammour**.
- Dr. Ms Amal Hijazi, consultant.
- **Mr. Zuhair Jwayhan / Chairman of the Board of Directors for the Jordanian Association of Exporters and producers of vegetables and fruits.**
- **Dr. Khalil al-Absi / Jordan Valley Authority**
- **E. Mr Solaimon Sawalha, representative of the Ministry of Agriculture.**
- **E.Ms Waad al-Jaafreh / Ministry of planning.**
- **Ms. Sana Qutaishat / Jordan Valley Authority.**
- **Ms Lubna Hashash / Agriculture Credit Corporation**

- Four Representatives from water users' associations: (These represent the local community each from the area they present)

1- Mr. Raef Ebeidawi. Northern Jordan Valley Regional Representative of Water User Association

2- Mr. Walid Al FaqeerMiddle Jordan Valley Regional Representative of Water User Association

3- Mr. Ayed Al-RawashdehFifa, Mazraa, Haddetha Regional Representative of Water User Association

4- Mr. Ahmed Abdul Karim Al-Salem Al-Edwan. Southern Jordan Valley / Kafrian Regional Representative of Water User Association

Meeting record (7)

The Directional Committee of
the Forum on water in the Jordan Valley

No.	Topic
1	Greeting of General Secretary of Jordan Valley Authority for the attendees
2	Dr. Amal presents a proposal on Climate Change Adaptation fund Fund Value : 9.26 million JD separated for several projects. This project will be managed by the ministry of planning and Jordan Valley Authority cooperatively. This project aims to adapting to climate changes by : - Institutional support (database, Agricultural Risk Fund CIS) - Reuse of processed water - Alternative Energy - Water Harvesting. - Managing farm (administratively and technically)
3	HE Secretary-General talked about : - There's a must to improve Al-mantah Hill Station. - As he explained, there are 150 acres owned by Jordan Valley Authority behind the building of Al-mantah Hill Station.
4	The General Secretary of Jordan Valley Authority explained that in addition of Al-mantah Hill Station, there is another filtering station which is Al-shouneh Al-Janobeyeh station with 125 acres (around the half size of the station).
5	Mr. Zuheir Jweihan talked about the detailed report about the organic agriculture and the integrated agriculture, and this report was at the Jordanian Association for Fruit and vegetables importers and producers.
6	Mr. Ayed Al Rawashdeh requested the possibility of providing the following : - Technical assistance in the integrated management for farms. - Compost for the factory of Southern Valley. - Reservoirs and assembling ponds. - Alternative Solar power for units standards. - First center for Grading , Packaging, and cooling.

C: community consultation session for the wastewater reuse at North Shouneh WWTP, project (1.4)

Following is the list of Participants who attended this consultation

List of Participants

Organization	الجهة	الإسم	Gender
Islamic Religiuos affairs department	مديرية الأوقاف	محمد سعدالعامر	Male
Retired	متقاعد	إسماعيل موسى أبراهيم	Male
Retired	تربية/متقاعد	محمد عز ابو عيد	Male
Jordan Valley Authority	سلطة وادي الأردن	المهندس قيس عويس	Male
Jordan Valley Authority	سلطة وادي الأردن	المهندس محمود القماز	Male
Department of Muaz Ibn Jabal Area	مديرية معاذ بن جبل	عبد الرحمن ذيب إبراهيم	Male
Directorate of Archeology for Northern Jordan Valley	مدير أثار الأغوار الشمالية	نضال كايد هندي	Male
Department of Muaz Ibn Jabal Area	بلدية معاذ بن جبل	المهندس غسان عبيدات	Male
Jordan Valley Authority	سلطة وادي الأردن	المهندس عدنان غرايبة	Male
Director of Muaz Ibn Jabal Department	رئيس بلدية معاذ بن جبل	المهندس محمود أبو جابر	Male
North Shouneh Land Registration Director	مدير تسجي أراضي الشونة الشمالية	حمد سليمان بن عبد الرحمن	Male

Male	المهندس احمد بن ياسين	مدير هندسة البلديات	Municipalities Engineering Director
Male	ماجد نواف عبد اللطيف المنسي	مختار الباقورة	Local Mayor of Baqura
Male	محمود خليل إبراهيم خليل	مختار عشيرة المحادلة	Local Mayor of Al Mhadleh
Male	الدكتور منجد الشريف	مدير مركز الملكة رانيا العبد الله لعلوم وتكنولوجيا البيئة/جامعة العلوم/أربد	Queen Rania center for environmental Sciences & Technology/ Just University
Male	مازن عز الإبراهيم	مديرية التربية والتعليم	Ministry of Education
Male	صالح عبد الوحد تعشري	مختار عشيرة المشارقة	local Mayor of Al Musharegah
Male	محمد أحمد طارق	جمعية الشونة الزراعية	Al Shouneh Agriculture Society
Male	المهندس وجدي مساعدة	رئيس بلدية طبقة فحل	Governer of Tabeqet Fahl
Male	منذر يوسف بلعاوي	التربية والتعليم /الاغوار الشمالية	Ministry of Education / Northern Jordan Valley
Male	المهندس ماجد أحمد جودة	رئيس قسم تشغيل محطات التنقية	Manager of water treatment operation division
Male	محمد خير عبابنة	دراسات/سلطة المياه	Water Authorities/ Studies Division
Male	ثائر ظاهر نايف	جمعية الشونة الزراعية	Al Shouneh Agriculture Society

Male	المهندس على عبيدات	وزارة التخطيط/مديرية المشاريع	MOPIC
Male	المهندس وائل سليمان	الجمعية العلمية الملكية	Royal Scientific Society
Male	المهندس محمود العلاونة	سلطة المياه	Water Authority
Male	المهندس ايمن أبو جلمة	وزارة السياحة	Ministry Of Tourism
Male	الدكتور هاشم أحمد الزعبي	سلطة المصادر الطبيعية	Natural Resources Authority
Male	صالح النعيمات	سلطة المصادر الطبيعية	Natural Resources Authority
Male	المقدم سميح القطاونة	رئيس مركز امن الاغوار الشمالية	Head of Northern Jordan Valley Security Check
Female	مها محمد حلالشة	باحثة في مركز البحوث المائية/الجامعة الأردنية	Researcher at/ water Research Center/ University of Jordan
Female	سعاد أسعد	سلطة المياه	Water Authority
Male	المهندس احمد صوالحة	الجمعية العلمية الملكية	Royal Scientific Scociety
Male	المهندس محمد الكوز	سلطة المياه	Water Authority
Male	رمزي سبيلا	الوكالة الإمريكية للتنمية الدولية	USAID
Female	الدكتورة امل حجازي	الوكالة الإمريكية للتنمية الدولية	USAID
Male	زياد محمد المراونة	جمعية البيئة الأردنية	Environment Society of Jordan
Male	المهندس عبد الله النعيمات	مدير الأراضي والري/وزارة الزراعة	Ministry Of

Agriculture			
Ministry of Environment	وزارة البيئة	المهندس بلال الشقارين	Male
Civil Defense	الدفاع المدني	حسان أحمد حمد العربي	Male
Ministry of Public works & Housing	وزارة الأشغال العامة والإسكان	المهندسة لبنا سامي عميرة	Female
Ministry of Public works & Housing	وزارة الأشغال العامة والإسكان	المهندسة أوريلياكوريا	Female
Water Authority	سلطة المياة	المهندس زيد الكيلاني	Male
Water Authority	سلطة المياة	المهندس أياد قاقيش	Male
Water Authority	سلطة المياة	المهندس عيسى منذر	Male
Directorate of Health in Northern Jordan Valley	مديرية صحة الاغوار الشمالية	الدكتور بلال بني هاني	Male
Water & irrigation Authority	سلطة المياه والري	المهندس محمد منصور	Male

(D): WUAs consultation meeting atFifa/Mazzrah/Khnaizereh/HadithaMeeting June 20, 2014 Project (1.5)

Requests raised by WUA representative in Southern Jordan Valley consultations related to project (1.5)

The attendees were:

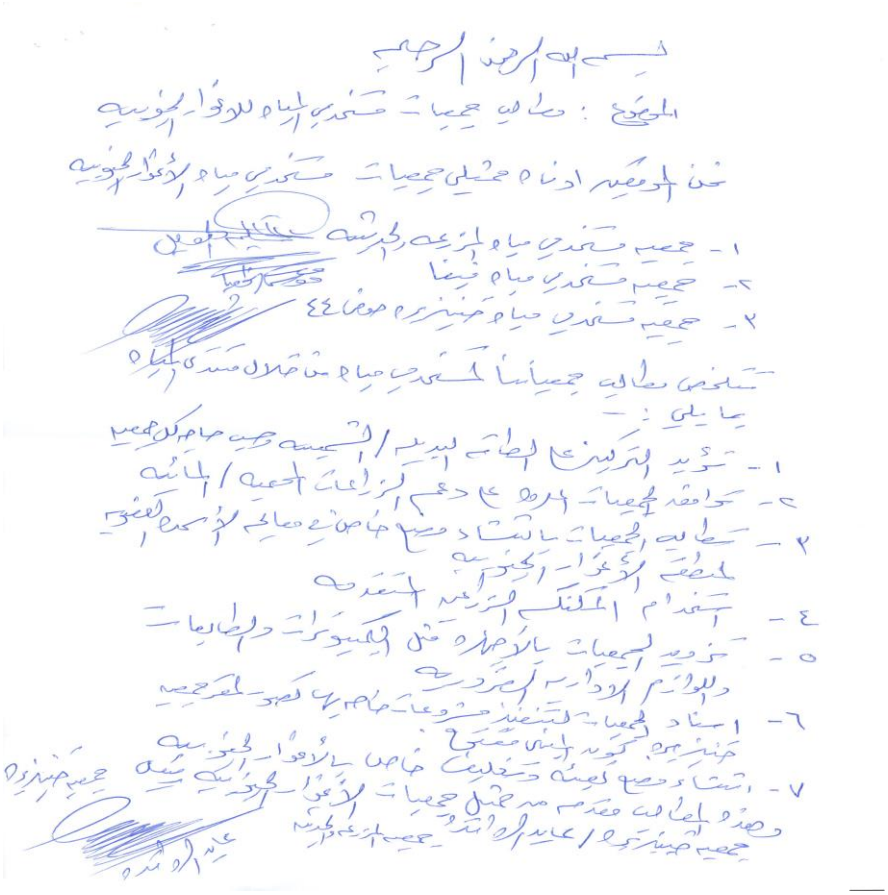
Water User Association (WUA) representative in Al Mazraha & Hadeetha Area

Water User Association (WUA) representative in Fifa

Water User Association (WUA) representative in Khanzeerah

Summary of Requests:

- Rainwater Harvesting Reservoirs & earthen Dams
- Supporting irrigated Agriculture production
- Agricultural Automation
- Support association through providing computers, printers, office furniture etc…..
- Financially support association to implement different projects related to water & agriculture awareness workshops.
- Establish filling & packaging unit for vegetables & fruits.



(E): Participants lists for Consultation meeting for Project (2.3) Jordan Valley Water Sustainability and Agribusiness Competitiveness

Submitted	Gender	Organization/ Occupation
Adnan Ahmad Fendi Alwaked	Male	Head of Al-A'adaseh (pump 2)
Ali Ibrahim Ali Al-Hussein	Male	Head of Northern Shouneh (pump 3,4)
Raef Obaidawi	Male	Head of Northern Shouneh (pump 5)
Abdallah Asa'd Al-Hourani	Male	Head of Al-Manshiyeh (pump 14)
Sulaiman Ghezawi	Male	Head of Tel Al-Arb'een (pump 22)
Ashraf Al Ghezawi	Male	Head of Sheikh Hussein (pump 28)
Nawaf Kareem Rayahneh	Male	Head of Al-Mashare' (pump 33)
Mithqal Al - Zenati	Male	Head of Wadi Al-Riyan (pump 36)
Zaki AlRabab'ah	Male	Head of Wadi Al-Riyan (pump 41)
Hafez Al Shobaki	Male	Head of Abu Sido (pump 50)
Waleed Al Faqeer	Male	Head of Al Kareemeh (pump 55)
Omar Masalha	Male	Head of Ghor Kibd (pump 78)
Tawfeeq Al-Satri	Male	Head of Ghor Kibd (pump 81)
Ali Mustafa	Male	Head of Ghor Kibd (pump 91)
Hussein Quttaineh	Male	Head of Ghor Kibd (pump 95)
Shlash Bader Al-Adwan	Male	Sh'aib dam/ Southern Shouneh
Ahmad Abdul Karim Salem al Adwan	Male	Al Kafrain
Awad Zaid Adwan	Male	Al- Ramah
Talal Farhan	Male	
Saleem Huwaimel	Male	Farm and Hadeesah
Sabry Ahmad Thala'een	Male	Ghor Al Safi
Mousa Salem Khoutaba	Male	Fiqa
Ayed saleh Al-Rawashdeh	Male	
Abdelkarim Shhab	Male	Farmer
HE Engineer Saad Abu Hammour	Male	SG JVA
Ali Soboh	Male	MoWI
Zakaria Zohdi Al-Haj Ali	Male	MoWI
Suha Al-Mughrabi	Female	MoWI
Eng Basem Telfah	Male	WAJ
Adnan Al khadam	Male	Farmer's Union
Saleh Al-Kharabsheh	Male	SG MoPIC
Ziad Obaidat	Male	MoPIC
Wa'ad Al-Ja'afrah	Male	MoPIC
Ahmad Al-Jazzar	Male	MoPIC
Radi al-Tarawneh	Male	SG MoAgriculture
Suleiman Al-Suwalha	Male	Ministry of Agriculture

Toufiq Al-Habashneh	Male	Farmer's Loan Association
Abdullah Freij	Male	Farmer's Loan Association
Dr Khalil Al Absi	Female	JVA
Ms Niveen Al Kfouf	Female	JVA
Fouad A'ajailat	Male	JVA
Mashhoor Harb	Male	JVA
Mahmoud Al-Qmaz	Male	JVA
Ghassan Obaidat	Male	JVA
Mousa Al-Huwarat	Male	JVA
Mohammad Al-Faheeli	Male	JVA
Ahmad Al-Azzam	Male	JVA
Ali Al-Omri	Male	JVA
Anwar Al-Adwan	Male	JVA
Sanaa Qtaishat	Female	JVA
Khairy Ammari	Male	JVA
Guy Honoré	Male	GIZ Water Programme Director
Ali Adwan	Male	GIZ
Hisham Al-Salamat	Male	GIZ
Sameer Abdel-Jabbar	Male	GIZ
Nour Habjouka	Female	GIZ
Emad Al-Khalil	Male	GIZ
Scott Greenwood	Male	GIZ/ California State University
Benjamin Herzberg	Male	WBI
Lili Sisombat	Female	WBI
Hnin Hnin Pyne	Female	WBI
Olivier Boudart	Male	EU
Amal Hijazi		Environmental Engineer
Vicky Swider-Al Halteh	Female	Event Manager
Dalia Naber	Female	Photographer
Naif Seder	Male	freelance consultant/ISSP
Basel Shehadeh	Male	
Baker Balawneh	Male	
Zuhail Al-Zo'bi	Male	Secretary General office
Ghassan Shehadeh	Male	Secretary General office

Consultation meeting at Al Jawasreh Area for the Permaculture Project (1.6) :

List of Participants who attended the consultation :

Name	Gender	Occupation
Hayel Abu Yaheya	Male	Supervisor of the Permaculture pilot/ Resident of Jawasreh area.
Abdulla Al Jebali	Male	Farmer/organic Agriculture
Awatef Ahmad Al Tallaq	Female	House wife/ Kafrain area
Amneh Ahmad Al Tallaq	Female	House wife/ Jufeh area
Naela Abu Yaheya	Female	House wife/ Kafrain area
Naeem Abu Yaheya	Male	Helps at Permaculture pilot/ Kafrain area
Fadia Abu Yaheya	Female	Helps at Permaculture pilot/ Kafrain area
Feryal Al Oushosh	Female	Genitor at Girls School/ Al Jawasreh Area
Ibrahim Ayed	Male	Works at Amman Manucipality branch at Kafrain area
Mohammad Ayed	Male	Works at Al Kafrain Municipality

ANNEX (3): The Methodology of Reporting Adaptation Fund Core Impact Indicators

Example :

Adaptation Fund Core Impact Indicators " Number of Beneficiaries "				
Date of Report				
Project Title	Project (1.1) *Reuse of Treated Wastewater for On-Farm Agricultural Adaptation and as a tool for Integrated Water Resources Management at Wadi Mousa*			
Country	Jordan			
Implementing Agency	PDTRA & WUA			
Project Duration	4 years			
	Baseline *(absolute number)*	**Target at project approval *(absolute number)***	**Adjusted target first year of implementation *(absolute number)***	**Actual at completion *(absolute number)***
Direct beneficiaries supported by the project				
Female direct beneficiaries				

Adaptation Fund Core Impact Indicators "Assets produced, Developed, Improved or strengthened "				
Sector (identify)	Baseline	Target at project approval	Adjusted target first year of implementation	Actual at completion
Targeted Asset **1) Health and Social Infrastructure *(developed/improved)*** **2) Physical asset *(produced/improved/strengthened)***				
Changes in Asset *(Quantitative or qualitative depending on the asset)*				

Youth direct beneficiaries				
Indirect beneficiaries supported by the project				

Adaptation Fund Core Impact Indicators " Number of Beneficiaries "				
Date of Report				
Project Title	Project (1.1) *Reuse of Treated Wastewater for On-Farm Agricultural Adaptation and as a tool for Integrated Water Resources Management at Wadi Mousa*			
Country	Jordan			
Implementing Agency	PDTRA & WUA			
Project Duration	4 years			
	Baseline *(absolute number)*	**Target at project approval *(absolute number)***	**Adjusted target first year of implementation *(absolute number)***	**Actual at completion *(absolute number)***
Direct beneficiaries supported by the project				
Female direct beneficiaries				
Youth direct beneficiaries				
Indirect beneficiaries supported by the project				

ANNEX (4): Relevant Information for the rain water Harvesting

Table (1.5 – A): Jordan's rainfall depth and its 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 (1.5-B): 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**

Rain Water Harvesting Interventions

The interventions that would be implemented can include the following:

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

Annex (5): Environmental Impact Assessment Approvals for Wastewater Treatment plants & their effluent wastewater reuse systems in the proposed project areas as approved by the donar lender agency funding the design, feasibility & construction of the related wastewater treatment plant & the final Approval of the EIA committee at Ministry of Environment according to regulation 37/ 2005

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
BUREAU FOR ASIA AND THE NEAR EAST
WASHINGTON, D.C. 20523

RECORD OF ENVIRONMENTAL DECISION

ANE 06-33 Jordan ROD EA North Shouneh WWT&R

Country Code-SO: 278-010

SO Name: Enhanced Integrated Water Resources Management

Country or Region: Jordan

Activity Name: Environmental Assessment, Wastewater Treatment Facilities for Small Communities in Jordan, Task 3, North Shouneh, August 2005, Record of Decision (ROD)

Funding Begin: 2004 **Funding End:** 2008 **Funding Amount:** $4,973,548

Approval Issue: **Environmental Assessment, Approved**

CLEARANCES:

ANE Bureau Environmental Officer
Approval: John O. Wilson — Dec 22, 2005 (Date)

Acting Mission Director
Approval: (signed) Anne Aarnes — December 12, 2005 (Date)

Deputy Mission Director
Approval: (signed) Michael T. Harvey — December 6, 2005 (Date)

Regional Legal Advisor
Approval: (signed) Monica Smith — December 5, 2005 (Date)

Mission Environmental Officer
Approval: (signed) Amal Hijazi — November 28, 2005 (Date)

OVERVIEW

Consistent with the approved scoping statement for an environmental assessment (ANE 05-144, approved July 11, 2005), USAID/Jordan plans to implement a low-cost, low-maintenance wastewater treatment and reuse (WWT&R) in North Shouneh and submits this Environmental Assessment (EA) in its support. The scoping statement identified potentially significant direct, indirect, and cumulative environmental impacts: 1) during construction (excavation, site erosion, air pollution from dust, health and safety, noise, removal of vegetative cover, alteration of surface hydrology); 2) during operation and maintenance (methane generation, sludge production, traffic, wildlife, pests, unplanned events, and risks to treatment plant); and 3) wastewater reuse (health and safety, soil and crop contamination).

The approved scoping statement was approved with the conditions that there is a participatory process to review and refine the nitrate standard for treated wastewater reuse in agriculture or discharge into wadis and national rivers, and that the results from that process becomes part of the final design of the proposed WWT&R project. Per clarification by Amal Hijazi and Ramzi Sabella, it was demonstrated that higher standards are more costly to build and operate, especially in the smaller communities. The draft feasibility study made the argument that in light of the quantities of treated wastewater reuse involved and potentially insignificant environmental impacts, that the less stringent interpretation of the standards should be applied. A workshop was conducted on the subject with the standards committee and other participants from WAJ. As a result of that workshop, Jordanian Authorities are revising the standards and are discussing context-specific standards (e.g., proximity to flowing wadis, depth of groundwater, seasonal variations).

The design of the North Shouneh Plant has the flexibility to achieve different levels of Nitrate depending on the existing standard level or a future level if amended. Therefore, the final design for North Shouneh took into consideration the potential for a change in standards. In conclusion, the treatment plant is designed to meet the current Nitrate standard, but has the ability to operate at a lower cost to meet a more relaxed nitrate standard if that is approved in the future.

DECISION **Environmental Assessment, Approved**

File No: ANE 06-33 Jordan ROD EA North Shouneh WWT&R

DISTRIBUTION:

Mission Environmental Officer
ROD File

USAID
FROM THE AMERICAN PEOPLE

ANE 06-33 Jordan IEE/EA ROD North Shouneh

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
~~BUREAU FOR ASIA AND THE NEAR EAST~~
~~WASHINGTON, D.C. 20523~~

REQUEST FOR APPROPROVAL OF ENVIRONMENTAL ASSESSMENT
ROD Jordan Wastewater Treatment Facilities for Small Communities in Jordan, Task 3, North Shouneh

PROGRAM/ACTIVITY DATA:

Country Code-SO: 278-010

SO Name: Enhanced Integrated Water Resources Management

Country or Region: Jordan

Activity Name: Environmental Assessment, Wastewater Treatment Facilities for Small Communities in Jordan, Task 3, North Shouneh, August 2005

Funding Begin: August 2005	**Funding End:** August 2008	**LOP Amount:** $18,000,000
		Sub-Activity Amount:
ROD Prepared by: Barney P. Popkin		**Date:** September 20, 2005

BACKGROUND:

The Water Authority of Jordan with the support of USAID plans to implement a low-cost low-maintenance wastewater treatment and reuse (WWT&R) project in North Shouneh. The WWT&R project in North Shouneh is part of the wider activity, Wastewater Treatment Facilities for Small Communities in Jordan (the "Small Communities Project"). According to the initial environmental examination (IEE) prepared by USAID Jordan in August 2004, the project requires a full environmental impact assessment (EIA).

The Small Communities Project will design, supervise and construct a proven low-cost/low-maintenance, wastewater treatment plant (WWTP) to serve North Shouneh (a residential community that lacks sewage collection networks), develop local capacity to operate and maintain the facility in a sustainable manner after the project ends, turn over the operation and maintenance of the facility to local bodies (e.g., Municipality, Village Councils, Private Sector), and eventually reuse the treated wastewater. This will serve as a model for other areas in Jordan. The project will span four years.

Currently, approximately 15,000 residents in the town of North Shouneh rely on cesspits (not septic tanks). These pits are generally permeable leading to seepage of septage and potential groundwater contamination. Nevertheless, residents need to empty their cesspits every couple of months (depending on permeability, storage volume and family size) because they frequently overflow. Tanker trucks in the area get paid by households to empty the cesspits. Although tanker drivers are required to discharge the septage in designated dumpsites, they frequently do so haphazardly in these and other locations, causing environmental and health pollution problems.

The scoping statement for the EA identified potentially significant direct, indirect and cumulative environmental impacts during: (i) construction: excavation and site erosion, air pollution from dust, health & safety, noise, removal of plant cover, alteration of surface hydrology; and (ii) operation and maintenance: methane generation, sludge production, traffic, wildlife, pests, unplanned events and risks to treatment plant; and (iii) water reuse: health & safety, soil and crop contamination. The Jordanian Ministry of Environment has already communicated its approval of the EA Statement.

ENVIRONMENTAL RECOMMENDATION:

USAID/Jordan funded the attached "Environmental Assessment (EA), Wastewater Treatment (WWT) Facilities for Small Communities in Jordan, Task 3, North Shouneh, August 2005," which was performed consistent with the approved Scoping Statement for the EA. The Scoping Statement issues were addressed, potential significant environmental impacts identified, and appropriate mitigation measures developed and evaluated for implementation. The Government of Jordan (GOJ) was provided with a copy of the draft EA and feedback was solicited. Approval by the GOJ was received via official communication that requested their comments be incorporated as part of the revised final EA. An appendix to the EA was created for incorporation of the GOJ comments. In light of the above USAID/Jordan recommends approval of the EA.

APPROVAL OF RECOMMENDED ENVIRONMENTAL ACTIONS:

CLEARANCE:

Mission Director
Approval: Anne Aarnes — Anne Aarnes — 12/12/2006 — Date

Deputy Mission Director
Approval: Michael T. Harvey — 12/06/05 — Date

Regional Legal Advisor
Approval: Monica Smith — 12/5/05 — Date

Mission Environmental Officer
Approval: Amal Hijazi — Amal Hijazi — Nov. 28, 2005 — Date

CONCURRENCE:

Bureau Environmental Officer — John O. Wilson — Date: Dec 22, 2005
Approved: ☑
Disapproved: ☐

بسم الله الرحمن الرحيم

THE HASHEMITE KINGDOM OF JORDAN

Ministry of Environment

AMMAN

المملكة الأردنية الهاشمية

وزارة البيئـــــــة

عمـــان

Ref. : 4-7-553

Date : 20-2-2006

Mr. Mehran Meserlian
Project Manager
CDM International Inc.

Subject: Reuse for Industry, Agriculture and Landscaping (RIAL) Project Wadi Musa Environmental Review.

Dear Sir,

Reference is made to your letter RIAL-GOJ 0071 dated on January 18, 2006 regarding the above mentioned project. I would like to inform you that the Final Review Report of project has been approved by the EIA Reviewing Committee.

Sincerely yours

Khaled Irani

Minister of Environment

هاتـــف ٥٥٦٠١١٣ - فاكـــس ٥٥٦٠٢٨٨ - ص.ب ١٤٠٨ عمان - ١١٩٤١ - الأردن
Tel. 5560113 - Fax 5560288 - P.O. Box 1408 Amman - 11941 - Jordan

بسم الله الرحمن الرحيم

THE HASHEMITE KINGDOM OF JORDAN
Ministry of Environment
AMMAN

المملكة الأردنية الهاشمية
وزارة البيئة
عمان

Ref: 1.1.4309
Date: 17.11.2005

الرقم :
التاريخ :
الموافق :

Mr. James Franckiewicz
Director, Office of Water Resources
& Environment
USAID

Subject: The Small Communities Wastewater Treatment Plants project at North Shouneh.

Dear Mr. Franckiewicz,

In reference to your letter dated 30 Oct 2005 regarding the above mentioned subject, we would like to inform you that we agree on the related draft EA document. However, the draft EA document should be read together with your attached response to the National EIA Committee's comments.

Sincerely,

Khaled Anis Irani

Minister of Environment

CC: EIA Director

هاتف ٥٥٦٠١١٣ - فاكس ٥٥٦٠٢٨٨ - ص.ب ١٤٠٨ عمان - ١١١٩٤ - الأردن

There was also a study financed by the Federal Republic of Germany through KFW, Titled" Feasibility study for the Re-use of treated wastewater in Irrigated Agriculture in the Jordan Valley"for the Benefit of Water Authority of Jordan. This study was prepared by GITEC Consult GmbH, AHT International GmbH, and Consulting Engineering Centre.

THE HASHEMITE KINGDOM OF JORDAN

Ministry of Water and Irrigation

Water Authority of Jordan

Design and Construction Supervision of Wastewater Collection and Treatment Systems in Greater Irbid - Stage II

Wadi Shallala

Central Tender 86/2000

Stage A – Final Engineering Design and Tender Documents

FINAL ENVIRONMENTAL ASSESSMENT

Funded by

Kreditanstalt für Wiederaufbau (KfW) &The Government of Jordan

April, 2003

The Joint Venture

FICHTNER BINNIE BLACK & VEATCH PFI iP consolidated consultants engineering & environment

Annex (6): Pertinent Standards & Regulations

Water- Industrial reclaimed wastewater

JS 202/2007 (Un official English Translation)

3-2
Industrial reclaimed wastewater

Resulting from water usage in all or some stages of manufacturing, cleaning, cooling or any other similar processes, whether with or without treatment and is compatible with the requirements of the Jordanian Standard.

3-3
Hazardous waste

Any material that is combined ,simple ,mixed or waste, whether natural or manufactured produced from industrial activities or processes and have dangerous features such as organic solvents, paints and dyes, etc., which are dangerous to the environment or any of its elements.

3-4
Solid waste

Solid or semi solid wastes which result from activities such as fermentation, burning, storing and causes damages to the environment such as Sludge, Rubble and others.

3-5
Hazardous Materials

Materials that have hazardous nature and can not be disposed in solid waste disposal locations or sanitary networks due to its effect on public health and Environment, or that d have a flamable properties and require special handling or disposal procedures

3-6
Facility Campus

The area that the industrial facility and its belongings is located on.

3-7
The responsible authority for re-use licensing

The official authority for licensing the re-use of industrial reclaimed wastewater for different purposes and according to what is contained in item 3-5 in the Jordanian Standard is the Ministry of Environment.

4-Shortcut icons, abbreviations and terminology

For the purposes of this Jordanian standard the following table contains the abbreviations for the listed definitions and terminology:

Table 1 _ Shortcut icons, abbreviations and terminology

Terminology	Symbol
Aluminum	Al
Arsenic	As
Beryllium	Be
Bicarbonate	HCO3
Biochemical Oxygen Demand (Five Day)	BOD5
Boron	B
Cadmium	Cd
Calcuim	Ca
Chemical Oxygen Demand	COD
Chloride	Cl
Chromium	Cr
Cobalt	Co
Colony forming unit	CFU
Copper	Cu
Cyanide	CN
Dissolved Oxygen	DO
Escherichia Coli	*E.coli*
Fat, Oil and Grease	FOG
Fluoride	F
Iron	Fe
Lead	Pb
Lithium	Li
Magnesium	Mg
Manganese	Mn
Mercury	Hg
Methylene Blue Active Substance	MBAS
Molybdenum	Mo
Most Probable Number	MPN
Negative Logarithm of H+ concentration	pH
Neuflumeter Turbidity Unit	NTU
Nickel	Ni
Nitrate	NO3
Selenium	Se
Sodium	Na
Sodium adsorption ratio	SAR
Sulphate	SO4
Total dissolved solids	TDS
Total Nitrogen	T-N
Total Organic Carbon	TOC
Total phosphate	P
Total Suspended Solids	TSS
Vanadium	V
Zinc	Zn

5- General conditions

The following requirements must be applicable for the industrial reclaimed wastewater:

5-1

Each industrial facility that intends to re-use the industrial reclaimed wastewater should obtain a special license from the official concerned authority (Ministry of Environment).

5-2

The official concerned authority will receive the request for the re-usage of the industrial reclaimed wastewater along with the following information:

- Maps and description of the geographical area that shows the specific location of the facility.

- Types of products.

- Production methods.

- Quality control requirements

- Principles and requirements of the various operations to reduce waste.

- Management plan for the various kinds of wastes.

- Plan of wastewater and solid wastes treatment.

- Plans for storage of materials, their handling and use.

-The staff number and the work shifts.

- The monthly amount of used water (for a year).

- The monthly effluent wastewater quantity and the discharge schedule.

-The location and surface area of the Industrial wastewater reclamation .

- Record of the materials that are used in the industry including substances used in production, cleaning and disinfection as well as other materials stored in the facility.

- The quality of the effluent wastewater according to the the type of industry and its own restrictions referred to in item 7.

- Indicate the type of treatment available to all stages in order to comply with the requirements of this Jordanian standard.

- Show alternatives for the disposal of industrial wastewater in case of not being able to re-use it.

-Any further information that the responsible authority sees as needed.

5-3

Based on the gained information from 5-2 the official responsible authority would classify the industry and specify the required regulations that should be applied according to rules in Item 8 and according to the final use that is planned for.

5-4
The effluent from industrial facilities (treated or untreated)must match the properties that are described in tables 2 to 7 contained in the Jordanian Standard and according to the final use as planned in order to prevent jeopardy to the various elements of the environment.

5-5
The official authority in some special cases, can allow re-use of the industrial reclaimed wastewater for the purposes of irrigation despite non compliance for some effluent criteria that are not related to public health provided that the requesting industry provides the needed studies that demonstrate no effect on the elements of the environment in the region the reuse operations will be held at. Along with this kind of exception an intense control over the quality of effluent water should be followed up by the authorities concerned in accordance with the requirements of this Jordanian Standard.

5-6
The discharge of industrial wastewater to the sewerage network is allowed when there is a compatiability in water quality to the instructions of linking to the public sewerage network which is published by the Water Authority and after obtaining a written approval from the Water Authority.

5-7
Avoid mixing the hazardous wastes with regular wastes.

5-8
The industrial facilities should adopt industrial pollution control technologies
5-9
The industrial facilities should adopt the clean production principle according to their environmental management systems.

5-10
Industrial wastewaters whether treated or not-treated should be transported by gray colored water tanks to the authorized receiving facilities.

6- General Requirements

6-1

All licensed industrial facilities should provide sewage systems for industrial wastewater which is separate from the municipal sewerage network. This requirement could be excluded if the owner of the facility could prove that mixing water will improve the effectiveness of the treatment process provided that approval of the concerned licensing authority is secured.

6-2

Previously licensed industrial facilities, that mixes industrial wastewater with municipal wastewater network should separate the two kinds of wastewater during any upgrades of the facility until the year 2010 or whichever comes first and during this period the effluent wastewater from the facility should match Specification of domestic or industrial wastewater, whichever is the strongest or harder to treat.

6-3
The wastewater should not be reused for irrigation purposes at areas nearby a water resource

and which negatively affect the water resources.

6-4
If the owner of the facility requests the permission to use the reclaimed water for other purposes that were not mentioned in this standard (such as for cooling or Fire extinguishing) the owner of the facility should refer to the official concerned authority to specify the standards and requirements that should be complied with assure that it would not affect the environmental elements and or it's chemical, natural and biological balance.

6-5
The facility's owner should keep the industrial facility effluent wastewater quality records for at least 5 years and present it to the official parties when requested.

6-6
The effluent properties should be measured, analyzed and tested as specified in "Standards Methods for Testing Water and Wastewater Hand ook" which is published by the American Society for Public Health and the American Society for Water and its amendments or any other approved methods of analysis.

7- Restrictions

7-1
The transport of industrial treated or untreated wastewater by tanks and disposal into municipal treatment facilities or, flood plains and valleys is not allowed before having the license from the authorized parties.

7-2
Discharging of industrial reclaimed wastewater to Aqaba Gulf or the valleys that lead to it is not permitted under any circumstances.

7-3
Reusing the reclaimed industrial wastewater outside the industrial facility grounds, or using it by a second party is not allowed without getting permission from the concerned licensing authority. Each party should adhere to the restrictions that are included in this Jordanian Standard. Also the agreements between the end user and the producer of the industrial wastewater should be made available when requested.

7-4
Mixing of the treated industrial reclaimed wastewater that is effluent form the industrial facility with fresh water in order to dilute it so that the Jordanian standard would be applicable for it is not allowed.

7-5
Exposure of workers to the industrial wastewater is not allowed unless the safety precautions are considered, such as wearing gloves and protective safety equipment for body, face, eyes and other parts.
the
7-6
It is not permitted to use industrial reclaimed wastewater for theirrigatingof the raw eaten fruits and vegetables.

7-7

Industrial reclaimed water is not allowed to be used near water resources.

8- Standard requirements

8-1

The industrial reclaimed wastewater is divided into three categories according to its final use:

- Disposal into water torrents, valleys and water bodies.
- Reusing it for irrigation purposes.
- Recycling these waters in the industrial facility.

8-2

Disposing Industrial reclaimed wastewater into torrents, valleys and water bodies is allowed if it has an applicable quality according to this standard and the properties that are mentioned in tables 2-5.

Table 2 - Industrial reclaimed wastewater quality properties allowed for disposal into torrents

Properties	Symbol	Upper Allowed limit mg/L (Except those referred to)
Biochemical oxygen demand	BOD5	60
Chemical Oxygen Demand	COD	150
Dissolved oxygen	DO	> 2.0
Total suspended solids	TSS	60
the logarithm of the reciprocal of hydrogen-ion	pH	6-9 a)
Nitrate	NO3	80
Total nitrogen	T-N	70
Change in the temperature of the received water	T	6 b)
Color	C	15
Turbidity	NTU	15 d)

a) unit

b) °C

c) Cobalt unit

d)Nephelometric Turbidity Unit : NTU

Table 3- Microbiological Properties for industrial reclaimed wastewater which been disposed into torrents, valleys and water bodies.

Symbol	Measuring Unit	Allowable Limit

Escherichia coli	Most Probable Number or a constituent unit of the colony	1000
Intestinal Helminthes Eggs	Egg/liter	< or = 1

Table 4 – Chemical and physical properties for industrial reclaimed wastewater which been disposed into torrents, valleys and water bodies.

Symbol	The upper allowed limit Mg/L
FOG	8
Phenol	<0.002
MBAS	25
TDS	2000
P	15
Cl	350
SO4	300
NH4	5
HCO3	400
SAR	9
TOC	55

Table 5 – Maximum allowable limit for the concentration of heavy and noble metals in industrial reclaimed wastewater which been disposed into torrents, valleys and water bodies.

Symbol	The upper allowed limit Mg/L
CN	0.05
Ba	1.0
Al	2
As	0.05
Be	0.1
Cu	1.5
F	2
Fe	5.0
Li	2.5
Mn	0.2
Mo	0.01
Ni	0.2
Pb	0.2
Se	0.05
Cd	0.01
Zn	5
Cr	0.1
Hg	0.002
V	0.1
Co	0.05
B	1.0
Ag	0.1

8-3
It's allowed to use the industrial reclaimed wastewater for the purposes of irrigation if it's quality matches the properties that are listed in Tables 6, 7 and 8.

Table 6 – The degree of processing and the biological indicators for the industrial reclaimed wastewater which are allowed for use for irrigation purposes.

Standards and properties	The maximum allowable limits according to the type of use Mg/L			
	Cooked vegetables, parks, playgrounds, and roadsides within the city I	Fruit trees, sides of the Highways and green spaces II	Field crops, industrial crops and forest trees III	Cut Flowers
Vital consumed Oxygen	30	200	300	15
Chemical consumed Oxygen	100	500	500	50
Dissolved oxygen	>2	-	-	>2
Total suspended solids	50	200	300	15
pH	6-9 (a	6-9 (a	6-9 (a	6-9 (a
The degree of turbidity	10 (b	-	-	5 (b
Nitrate	30	45	70	45
Total nitrogen	45	70	100	70
Escherichia coli	100 (c	1000 (c	-	1.1 (c
Intestinal Helminthes Eggs	< or = 1 (d	< or = 1 (d	< or = 1 (d	< or = 1 (d
FOG	8	8	8	2

a) Unit
b)Nephelmetric
c) Most probable number or a constituent unit of the colony/100 ml
d)Egg/Liter

Table 7 – Chemical and Physical properties for Industrial reclaimed wastewater which is used for irrigation.

Symbol	Maximum allowable limit Mg/L
FOG	8.0
Phenol	<0.002
MBAS	100
TDS	2000
P	30
Cl	400
SO4	500
HCO3	400
Na	230
Mg	100
Ca	230
SAR	9.0

Table 8- Maximum allowable limits of heavy and noble metals concentrations in Industrial reclaimed wastewater to be used for irrigation

Symbol	Maximum allowable limit Mg/L
Al	5
As	0.1
Be	0.1
Cu	0.2
F	2
Fe	05.
Li	0.075 (for Citruses 2.5)
Mn	0.2
Mo	0.01
Ni	0.2
Pb	0.2
Se	0.05
Cd	0.01
Zn	5.0
Cr	0.1
Hg	0.002
V	0.1
Co	0.05
B	1.0
CN	0.1

8-3-1 If it is determined that the industrial production process contains toxic chemicals, monitoring of effluent for these substances is conducted to ensure that discharge limits are not exceeded d as stated in internationally accepted standards and values, and when it is not available a technical study is held and its results are submitted to the concerned official authority.

8-3-2 Irrigation by sprinkles is allowed only for golf fields and it should be practiced only at night from 6 pm till 1 am using removable sprinkles that are not subject for daily use.

8-3-3 when industrial reclaimed wastewater is used for irrigation, irrigation should be stopped 2 weeks before fruit harvest.

8-3-4 when using reclaimed wastewater to irrigate fruit trees and vegetables, fallen fruits that touch the soil must be excluded from sale and not be allowed for Human consumption.

8-4industrial reclaimed wastewater maybe recycled to be used in the same or other production operations. Specifications of the recycled water may be different according to the factory's water's quality requirements as long as the occupational safety of the workers is being considered as listed below (it is preferable that recycling be conducted internally as a means of water conservation measure):

8-4-1 wastewater must flow in closed pipes to prevent interaction with workers.

8-4-2 the amount of the wastewater for reclamation should be less than the maximum capacity of the treatment plant.

8-4-3 the owner should have a plan for treated wastewater disposal in cases of emergency which do not allow the recycling operation inside the facility.

8-5 inspection authorities should environmentally audit the industry once every three months to ensure that adherence to the requirements is taking place.

9- Quality Control

9-1 The Quality control mechanism to be applied on the amount of effluent discharged from the industry (> or < 100 m3 daily). The repetition and analyzing of all samples should be held according to the table # 9.

Table 9 -
Frequency of sampling done by the industrial establishment to control the quality of reclaimed wastewater which will be disposed into torrents, valleys and water bodies.

Industry	Frequency of sampling							
	Table 2 is applied		Table 3 is applied		Table 4 is applied		Table 5 is applied	
	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day

Packaging, wrapping, paper, cardboard and office supplies	Monthly	15 days	Monthly	15 days	Monthly	15 days	quarterly	Monthly
Food supplies, agricultural and livestock industries	Monthly	15 days	15 days	weekly	monthly	15 days	quarterly	Monthly
Leather and Textile industries	Monthly	15 days	15 days	Weekly	Monthly	15 days	quarterly	Monthly
Chemicals & Cosmetic industries	Monthly	15 days	Monthly	15 days	Monthly	15 days	quarterly	Monthly
medical supplies & therapeutic industries	Monthly	15 days	15 days	weekly	Monthly	15 days	quarterly	Monthly
Mining Industry	3 months	3 months	15 days	weekly	quarterly	Monthly	quarterly	Monthly
Electrical, engineering and and IT industries	Monthly	Monthly	15 days	Weekly	quarterly	Monthly	quarterly	Monthly
Rubber and plastic Industries	Monthly	Monthly	15 days	Weekly	quarterly	quarterly	quarterly	Monthly

9-2 the process of observing and quality control by the industrial facility for the reclaimed wastewater which been used for irrigation as viewed in table 10.

Table 10- Frequency of sampling by the industrial facility to observe the quality of the reclaimed wastewater that is used for irrigation.

Type of Agriculture	Frequency of agriculture usage					
	Table 6 is applied		Table 7 is applied		Table 8 is applied	
	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day
Cooked vegetables, parks, playgrounds, and roadsides inside the industrial facility grounds	Monthly	15 days	Quarterly	Monthly	Every 6 months	Quarterly
Fruit trees and green areas	Monthly	Monthly	Every 6 months	Quarterly	Every 6 months	Quarterly

Field and industrial crops and forest trees	Every 6 months	Monthly	Every 6 months	Quarterly	Every 6 months	Quarterly

9-3 Quality Control Mechanism

9-3-1 the specialized control authorities would take samples of the industrial reclaimed wastewater which will be disposed into torrents, valleys or water bodies as frequent as referred to in table 11.

Table 11 – the frequency of sampling by the specialized control authorities for the industrial reclaimed wastewater to be disposed into torrents, valleys or water bodies.

Industry	Frequency of sampling							
	Table 2		Table 3		Table 4		Table 5	
	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day
packaging, wrapping, paper, cardboard and office supplies	Monthly	15 days	Monthly	15 days	Monthly	15 days	quarterly	Monthly
Food supplies, agricultural and livestock industries	Monthly	15 days	15 days	weekly	monthly	15 days	quarterly	Monthly
Leather and Textile	Monthly	15 days	15 days	Weekly	Monthly	15 days	quarterly	Monthly
Chemicals & Cosmetics	Monthly	15 days	Monthly	15 days	Monthly	15 days	quarterly	Monthly
medical supplies & therapeutic industry	Monthly	15 days	15 days	weekly	Monthly	15 days	quarterly	Monthly
Mining Industry	3 months	3 months	15 days	weekly	quarterly	Monthly	quarterly	Monthly
Electrical, engineering and IT industries	Monthly	Monthly	15 days	Weekly	quarterly	Monthly	quarterly	Monthly
Rubber and plastic Industries	Monthly	Monthly	15 days	Weekly	quarterly	quarterly	quarterly	Monthly

9-3-2 the specialized control authorities would take samples of the industrial reclaimed wastewater which been used for irrigation purposes as frequent as it listed in table 12.

Table 12 – the frequency of sampling by the specialized control authorities for the industrial reclaimed wastewater which been used for irrigation purposes.

Type of Agriculture	Frequency of agriculture usage					
	Table 6 is applied		Table 7 is applied		Table 8 is applied	
	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day	<100 m3/day	>=100 m3/day
Cooked vegetables, parks, playgrounds, and roadsides inside the industry's grounds	Monthly	15 days	Quarterly	Monthly	Every 6 months	Quarterly
Fruit trees and green areas	Monthly	Monthly	Every 6 months	Quarterly	Every 6 months	Quarterly
Field and industrial crops and forest trees	Every 6 months	Monthly	Every 6 months	Quarterly	Every 6 months	Quarterly

9-3-3 the owner of the industrial facility should ensure the match between the qualities of the water to the standards and its end use. Laboratory tests should be conducted and results should be recorded in an official manner for display upon demand and in accordance to the frequency specified in tables 9 and 10.

9-3-4 the samples should be collected, stored transported and analyzed at specialized laboratories according to the sampling methods specified in "Standards Methods for Testing Water and Wastewater Hand ook" which is published by the American Society for Public Health and the American Federation for water research, and contamination and any follow up amendments or newproved analytical procedures if not available in the above mentioned references.

9-3-5 For mechanical treatment plants that have polishing ponds and for biological wastewater treatment plants that rely on natural treatment the BOD5 would be measured after the filtration process.

9-3-6 the engineering average would be taken into consideration when calculating the results for thermo tolerant Coliform or Escherichia coli when water quality is being evaluated.

9-3-7 when evaluating the industrial reclaimed wastewater content of total nitrogen, the arithmetic rate would be used where the samples would not be less than five.

9-3-8 when no techniques are available the results of testing the thermo tolerant coliform would replace the Escherichia coli tests when the technical testing facilities are not available.

9-3-9 In the event of an an epidemic situation, the monitoring and operational authorities should investigate the possibilities of the presence in water of intestinal coli forms

9-4 Evaluation Mechanism

9-4-1 the timelines identified in tables 9 and 10 should be adopted for the evaluation of the quality the industrial reclaimed wastewater and its use purposes as identified in this standard.

9-4-2 when any of the limits specified in the standard for the rules of disposing the industrial reclaimed wastewater to torrents, valleys and water bodies is exceeded, another sample would be

tested and if the laboratory tests confirms the violation a notice for the responsible party would be issued to correct the situation in no more than one month.

9-4-3 when any of the standard regulation for the rules of reusing the industrial reclaimed wastewater is violated, a confirming sample would be taken and tested and if the laboratories tests confirm violation in the two samples a notice for the responsible party would be issued to correct the situation, and if the violation continues for more than 3 months the industrial reclaimed wastewater use would be stopped as for the authorized reuse until the sampling confirms water quality stability.

9-4-4 The American Environmental Protection Agency standards or any equivalent European standard would be used when there is an absence of standard values for some criteria elements which are not stated in this standard

Supplement -- A

Industrial Sector

Industries are classified according to industrial sectors in the table A—1

Table A—1 Industries according to the industrial sectors

Number	Industrial Sector	Industry
1	Leather and Textile	Natural textile fibers
		Strings
		Fabrics
		Ready-made textile species
		Carpets
		Knitting
		Clothes
		Fur
		Accessories and textile supplies
		Natural and industrial leather
		Bags
		Shoes
		Shoes supplies
		Any other similar industries related to this sector
2	medical supplies & therapeutic industry	Therapeutic and medical materials
		medications
		Natural medical products and supplies
		medical and therapeutic disinfectants
		Laboratory reagents and medical supplies
		Visual and audio devices
		Dental devices and accessories
		Medical Consumables
		Any other similar industries
3	Chemicals & Cosmetics	Glue
		Refined petroleum products

		Organic chemicals
		Non-Organic chemicals
		Tanning and coloring Paints and accessories
		Fertilizers and pesticides
		Intermediate Petrochemicals
		Powders, pastes and cleaning soaps
		Perfumes,essences,and cosmetics
		Glues and Adhesives
		Matches
		explosives and fireworks
		Inks
		Other chemical products
		Any other similar industries
4	Rubber and Plastic Industries	Tyers
		Rubber Industry Products
		Strings and special forms made from plastics
		Plastic hoses and pipes
		plastic sheets, plates and products
		plastic Basins and containers
		Fiberglass and products
		Sponge products
		Plastic accessories
		Plastic equipment and supplies for agriculture usage
		Plastic Dolls and Toys
		Plastic home supplies
		Any other similar industries
5	Engineering and electrical industries and IT	Electrical Power
		Primary Iron and steel industries
		Primary metal industries (other than Iron and steel)
		Metallic Construction Products
		Metallic Home supplies
		Sharps and cutting instruments
		Wires, nails and screws
		Casting, forming and machining works
		Electrical home equipment and supplies
		Central heating and solar systems supplies
		metallic agricultural equipment and supplies
		Electrical, wires and lightening supplies
		Electric devices
		Primary cells
		Receiver, broadcast and recording TV and Radio devices

		Vehicles and transportation equipment and supplies
		jewelery work
		Metallic mechines and tools
		Pumps, elevators, hoists and ladders
		Air conditioning, heating equipment, extinguishers and their supplies
		Construction machines, tools and equipment
		Weight and measuring tools
		Food and water preparation tools
		Clocks and alarms
		IT and communication industry
		Any other similar industries
6	Wood works and Furniture	Processed wood
		Carpeting and decoration works
		Cork and straw products
		home Glass ware and
		home Ceramics and glass supplies
		Home and office metallic and wood furniture
		Kitchens
		Specialized furniture
		Parts of furniture
		Other furniture products
		Furniture supplies
		Any other similar products
7	Construction Industries	Building masonry blocks, quarry and sands
		Materials for construction insulation
		sanitary piping systems and supplies
		Floor tiles
		Glass boards
		Thermal construction products
		Concrete products for construction
		Reinforcing steel and metal structures
		Construction and decoration products
		Any other similar industries
8	food supplies, agricultural and Livestock industries	Agricultural and gardening products
		Livestock
		Animal products
		Red and white meat and their products
		Fruit, nuts and vegetables
		Fruit and vegetables juice

		animal and vegetable oils and grease , and seasame productsand
		Milk and diary products
		Grain mill products
		Animal Feed
		Flour and wheat products
		Cocoa and sweets
		Coffee , tea, spices, salt and pepper
		Yeasts
		Drinks
		Tobacco and itsproducts
		Other food products
		Any similar industries
9	packaging, paper, cardboard and office supplies	Paper cakes and paper
		related products other than paper based products
		printing
		Office supplies
		Printing and packaging supplies
		Film services production and graphic design products
		Filling products
		Any other similar industries
10	Mining	Mined stones and sand
		Chemical metals
		Cement

JS 893/2006 Reclaimed Water Specifications

1) FIELD (DOMAIN)

This standard specification specializes with the conditions that should be available in the treated wastewater that could be drained or reused according to the demonstrated methods aspects in this specification.

2) DEFINITIONS

2.1: Wastewater: Domestic wastewater that might include industrial liquid wastes that is allowed to be drained to the wastewater networks according to the official connecting conditions of the authorities concerned.

2.2: Reclaimed Water: treated wastewater which is intended to be used according to this specification unless this wastewater is mixed with other resources.

2.3: Green Areas: Areas that are specified for aesthetic purposes but not for promenade purposes.

2.4: Mechanical treatment systems: Systems that use mechanical methods for treating wastewater such as activated sludge, RBC (Rotating Biological Contactors) and trickling filters.

2.5: Natural treatment systems: systems that treat wastewater naturally by aerobic, anaerobic or maturation ponds.

2.6: Disinfections: process which removes or decreases pathogenic micro-organisms or pollution indicating ones that might exist in water through using disinfectants such as chlorine, ClO_2, UV, ozone or any disinfectant adopted by authorities concerned.

2.7: Industrial products: products used for industrial purposes such as wood and olive trees.

2.8: Field products: products planted in wide areas and harvested yearly which include the following:

2.8.1: Fodder Products: products planted for animals feeding purposes such as alfalfa, sweet corn, sudani grass.

2.8.2: Crops Products: products planted for its carbohydrates grains to be used for feeding humans and animals such as: wheat, barley and corn.

2.8.3: Bean Products: products used for their seeds after drying such as lentil, fenugreek and lupine.

2.8.4: Fiber products: products planted for their fibers such as cotton and linaceae.

2.8.5: Oil products: products planted for their oil such as, sesame and soya beans.

2.8.6: Sugar products: crops planted to extract sugar such as sugerbeet and sugarcane

2.9: Cooked vegetables: vegetables usually eaten after cooking which includes: aubergine, zucchini, beans, cauliflower, potato, okra, peas, spinach, and artichoke, turnips, Jew's mallow.

2.10: Vegetables eaten raw: include the following vegetables: Tomato, cucumber, green pepper, cabbage, onion, carrot, radish, lettuce, mint, rocket, legume, strawberry, water melon muskmelon, parsley and coriander.

3) GENERAL CONDITIONS

3.1: Reclaimed water specifications are divided into two main parts:

A- Reclaimed water for wadi discharge purposes.
B- Reclaimed for reusing purposes.
Reclaimed water should conform to specified conditions for every part and according to the final planned use.

3.2: It is not allowed to dilute reclaimed water by mixing it in the treatment plant with pure water to achieve the stated conditions in this specification.

3.3: In case reclaimed water is used for purposes other than those stated in this specification (such as cooling or fire fighting), a standard specification concerning such use is to be used after appropriate researches carried out bearing in mind health and environmental effects.

3.4: Official authorities concerned for operating and developing wastewater treatment plants should always attempt to improve treated water quality to standards that might exceed these stated in this specification for the best use of reclaimed water and environmental conservation purposes.

4) STANDARD (STIPULATIONS / STIPULATING)

4.1: Reclaimed water for the purpose of charging streams of water, valleys or spread areas of water:

4.1.1: Reclaimed water is allowed (permitted) to be thrown in those areas when its quality agrees with specifications and standards mentioned in Table 1. It is forbidden to throw water into the valleys leading to the Gulf of Aqaba.

4.1.2: When the reused water flows in lands which rise over or lead to groundwater reservoir adequate arrangements should be taken to prevent seepage of reused water into groundwater.

4.1.3: When throwing treated wastewater (in what way mentioned in 4.1) exposed to direct contact with people (citizens) it is preferred to use one of the suitable processes of disinfection to protect public health. In case of using chlorine as a disinfectant, the residual chlorine should not exceed 1.0 ppm.

4.1.4: Waste stabilization ponds effluents are allowed to exceed the amounts pertaining to E. Coli when throwing water into valleys which lead to dams where water is stored up and used totally for the purpose of irrigation. However, where this water is used before reaching the dams, standards pertaining to reclaimed water irrigation purposes should be maintained.

Table 1: Allowable limits for treated wastewater discharged into streams, valleys or lakes

Standards	Allowable concentration
GROUP A	
BOD_5 (mg/1)	60*
COD (mg/1)	150*
DO (mg/1)	>1
TSS (mg/1)	60*
pH (unit)	6-9
NO_3 (mg/1)	80
T-N (mg/1)	70
E. coli MPN or CFU / 100ml	1000
Intestinal Helminth Eggs (egg/1)	< or =1
FOG (mg/1)	8.0
GROUP B	
Phenol (mg/1)	<0.002
MBAS (mg/1)	25
TDS (mg/1)	1500
Total PO_4 (mg/1)	15
Cl (mg/1)	350
SO4 (mg/1)	300
HCO^3 (mg/1)	400
Na (mg/1)	200
Mg (mg/1)	60
Ca (mg/1)	200
SAR	6.0
Al (mg/1)	2.0
As (mg/1)	0.05
Be (mg/1)	0.1
Cu (mg/1)	0.2
F (mg/1)	1.5
Fe (mg/1)	5.0
Li (mg/1)	2.5
Mn (mg/1)	0.2
Mo (mg/1)	0.01
Ni (mg/1)	0.2
Pb (mg/1)	0.2
Se (mg/1)	0.05
Cd (mg/1)	0.01
Zn (mg/1)	5.0
Cr (mg/1)	0.02
Hg (mg/1)	0.002
V (mg/1)	0.1
Co (mg/1)	0.05
B (mg/1)	1.0
CN (mg/l)	0.1

* BOD value is calculated after the process of filtration is carried out for the waste stabilization ponds or other treatment plants which include polishing lagoons.

* Amounts may be doubled for waste stabilization ponds or other treatment plants which include polishing lagoons.

4.2: Reclaimed water for reuse purposes:
This water is used for charging groundwater and for irrigation purposes.

4.2.1: Reuse for the purpose of artificial groundwater recharging:

4.2.1.1: Treated wastewater may be used for the purpose of artificial groundwater recharging whenever its quality is in agreement with the standards shown in table 2.

4.2.1.2: This water should not be used for recharging groundwater which is utilized for drinking water purposes.

4.2.1.3: Appropriate Technical studies should be carried out before using this water for recharging groundwater specified for irrigation so as to show that this water will not affect ground water basins specified for drinking purposes.

Table 2: Allowable limits of water quality which may be used for artificial groundwater recharging purposes

Standards	Allowable Amount
GROUP A	
BOD_5 (mg/1)	15
COD (mg/1)	50
DO (mg/1)	>2
TSS (mg/1)	50
pH (unit)	6-9
Turbidity (NTU)	2
NO_3 (mg/1)	30
NH_4 (mg/1)	5
T-N (mg/1)	45
E. Coli MPN or CFU/ 100ml	<2.2
Intestinal Helminthes Eggs (egg/1)	< or 1
GROUP B	
FOG(mg/l)	8.0
Phenol (mg/1)	<0.002
MBAS (mg/1)	25
TDS (mg/1)	1500
Total PO_4 (mg/1)	15
Cl (mg/1)	350
SO4 (mg/1)	300
HCO^3 (mg/1)	400
Na (mg/1)	200
Mg (mg/1)	60
Ca (mg/1)	200
SAR	6.0
Al (mg/1)	2.0
As (mg/1)	0.05
Be (mg/1)	0.1
Cu (mg/1)	1.5
F (mg/1)	2.0
Fe (mg/1)	5.0
Li (mg/1)	2.5
Mn (mg/1)	0.2
Mo (mg/1)	0.01
Ni (mg/1)	0.2
Pb (mg/1)	0.2
Se (mg/1)	0.05
Cd (mg/1)	0.01

Standards	Allowable Amount
Zn (mg/1)	5.0
Cr (mg/1)	0.05
Hg (mg/1)	0.001
V (mg/1)	0.1
Co (mg/1)	0.05
B (mg/1)	1.0
CN (mg/l)	0.1

4.2.2: Reuse of reclaimed water for irrigation purposes.

4.2.2.1: Reuse of reclaimed water for irrigation purposes requirements consists of two main groups: standards and guidelines:

- Standards are those mentioned in table 3 which oblige the operating agency to be committed to producing water conforming to those standards according to the uses mentioned in the specification.
- Guidelines are those values mentioned in table 4 and considered as inferential values. In case of surpassing them the operating agency should carry out scientific studies, which aim at clarifying the effect of such water on public health and environment and suggest practical procedures to avoid any kind of harm on them.

4.2.2.2: This water should not be used to irrigate vegetables eaten uncooked (raw).

4.2.2.3: Sprayer must not be used for the purposes of irrigation except in golf yards. Such sprayers have to be used at night. They should be movable and should not be used during daytime

4.2.2.4: Irrigation should be stopped two weeks before reaping (harvesting) the harvest if reclaimed water was used to irrigate fruitful trees. Falling fruits and those touching the soil should be eliminated.

Table 3: Stipulating characteristics and standards which should be maintained for treated effluents reused for irrigation

Permitted limits according to aspects of uses.	

Standards and characteristics	Permitted limits according to aspects of uses			Roses
	Cooked vegetables, parks, playing ground and side ways in populated areas	Fruit trees, highway trees and green areas	Field crops, industrial crops and forest trees	
	A	B	C	
BOD_5 (mg/1)	30	200	300	15
COD (mg/1)	100	500	500	50
DO (mg/1)	>2	-	-	< 2
TSS (mg/1)	50	200	300	15
pH (unit)	6-9	6-9	6-9	6.9
Turbidity (NTU)	10	-	-	5

5.2: Operating authorities are responsible for taking composite samples every 2 hours for 24 hours according to the succession illustrated in schedule No. 5 meanwhile monitoring authorities are responsible for collecting samples in the manner these suitable.

5.3: Succession of collecting samples for monitoring and operating agencies shall be according to schedule No. 5.

5.4: Samples are to be taken kept transmitted and analyzed according to the Standard Methods for the Examination of Water and Wastewater issued by the American Public Health Authority and American Society for Water Research and Pollution Control and its appendixes or any other accredited analysis methods if not available in the above reference.

5.5: As for mechanical treatment plants that include polishing ponds and waste stabilization ponds, BOD5 is calculated after filtration.

5.6: Geometric mean is used to calculate heat resistance facial coliforms results or E.Coli at evaluating reclaimed water quality.

5.7: As for evaluating total nitrogen content in the reclaimed wastewater, geometric mean is used but for not less than 5 samples.

5.8: Heat resistance faecal coliforms test results are considered to be an alternate for E.Coli test results when technical instrument are not available.

5.9: In case of specifying new criteria unstated in these specifications, the Specification and Metrology foundation is to be referred to.

5.10: In epidemic cases, monitoring and operating authorities should investigate the intestinal pathogens presence in water resources.

6) EVALUATING PROCEDURES

6.1: For the purpose of evaluating reclaimed water quality which will be used according to demonstrated methods in this specification, time intervals illustrated in schedule No. 5 are to be accredited.

6.2: If any of the criteria concerning discharge of reclaimed water to wadies or streams is exceeded, an extra emphatic sample is to be taken from reclaimed water, if laboratory results of the two samples do not comply with the standards, the concerned authority should be notified to correct the situation as soon as possible.

6.3: If any exceeding of the standards of the reuse of reclaimed water appears, a confirmative additional sample is to be taken from reclaimed water. If the laboratory results do not comply with the standards, the authority concerned should be informed to correct the situation. If the case lasts for more than three months, the use of treated wastewater which surpasses the standards should be stopped until quality is stable.

5.2: Operating authorities are responsible for taking composite samples every 2 hours for 24 hours according to the succession illustrated in schedule No. 5 meanwhile monitoring authorities are responsible for collecting samples in the manner these suitable.

5.3: Succession of collecting samples for monitoring and operating agencies shall be according to schedule No. 5.

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Table 5: Number of samples and tests required for quality control of treated wastewater

Treatment Plant	Sampling succession		Assessment Duration
Type	Operating Agency	Monitoring Agency	
Mechanical WWTP	Routine tests: 8/M* Phys.&Chem. Tests: 3/D** Helminth eggs: 4/M* E.Coli :8/M**	Routine tests: 2/M Phys.&Chem. Tests: 2/M Helminth eggs: 2/M E.Coli: 2/M	3 Months
Natural Treatment	Routine tests: 4/M* Phys.&Chem. Tests: 3/D** Helminth eggs: 2/M* E.Coli : 4/M**	Routine tests: 1/M Phys.&Chem. Tests: 1/M Helminth eggs: 1/M E.Coli : 1/M	6 Months

* Composite samples
** Grab sample

Routine tests: NO3, BOD, COD, TSS, NH4 and T-N.
Physical & chemical tests: pH, DO, Res. Chlorine, Turbidity and Temperature.

FROM : SG0OFFICE0MOENV FAX NO. : 065525315 Sep. 02 2014 02:25AM P1

وزارة البيئة

الرقم ٥٣٣٢/٢/١٨

التاريخ

الموافق ١١/٩/٢٠١٤

To: The Adaptation Fund Board
c/o Adaptation Fund Board **Secretariat**
Email: Secretariat@Adaptation-Fund.org; **afbsec@adaptation-fund.org**
Fax: 202 522 3240/5

Subject: Endorsement for "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"

In my capacity as designated authority for the Adaptation Fund in the Hashemite Kingdom of Jordan, I confirm that the above national fully-developed project is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in the Hashemite Kingdom of Jordan.

Accordingly, I am pleased to endorse the above fully-developed project with support from the Adaptation Fund. If approved, the project will be implemented by the Ministry of Planning and International Cooperation (MOPIC), and the Project will be also executed by national executing entities.

Sincerely,

Dr. Taher Al-Shakhsher
Minister of Environment

المملكة الأردنية الهاشمية
هاتف: ٥٥٦٠١١٣ ٦ ٩٦٢+ فاكس: ٥٥١٦٣٧٧ ٦ ٩٦٢+ ص.ب: ١٤٠٨ عمان ١١٩٤١ الأردن ، الموقع الإلكتروني: www.moenv.gov.jo