

Annex 19: Costs & financing and Economic and Financial Analysis- BRCCJ Funding Proposal- Jordan.

Building resilience to cope with climate change in Jordan through
improving water use efficiency in the agriculture sector (BRCCJ)

Hashemite Kingdom of Jordan

GCF/FAO-DPI

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1. Introduction

The current appendix aims to summarize the main assumptions, hypothesis and results of the Building resilience to cope with climate change in Jordan through improving water use efficiency in the agriculture sector (BRCCJ) Project's Economic and Financial Analysis.

The first part of the document summarizes the methodology, criteria and assumptions for the costing (resulting in Annex 4 of the Funding Proposal¹), as well as the financing plan and implementation timeline (resulting in Annex 5 of the Funding Proposal²) for the seven-year implementation period. Project's Costs were introduced in the PB tool developed by FAO to comply with GCF requirements obtaining cost table formats and figures. The current work also provided inputs to draft the Procurement Plan for the first 18 months (Annex 10³ of the Funding proposal).

Then the working paper summarizes the main assumptions, hypothesis and results of the Project's economic and financial analysis (resulting in Annex 3 of the Funding Proposal⁴). The profitability indicators are calculated taking into account the outcomes, phasing and expected beneficiaries for each type of activity beyond project lifetime. Sources of information combine specialized papers and references (see References), official data and field visits. The resulting figures were double-checked with technical specialist for each source of benefits. In addition to the estimates on main profitability indicators, a sensitivity analysis was conducted to test the results and a risk assessment matrix prepared to link the current risks and the EFA estimates. Finally, Cost-efficiency benchmarks are being provided.

The last section provides information on the Macroeconomic overview and the current financial needs of the recipient, followed by detailed tables in Annexes and the list of the main references used.

2. Projects Costs and Financing

2.1 Main assumptions and hypothesis

Costs and financiers. Total project costs are estimated at US\$ 33.25 million. The total comprises a GCF grant of US\$ 25 million (75% of total project cost). Government of Jordan contribution of US\$ 6.2 million (19%), and FAO and UNDP co-financing of about 2.06 million (1 million and 1.06 million respectively, representing 6% of total costs). The beneficiaries are expected to provide USD 4.6 million, which is not accounted as co-finance.

Project implementation period. The Project will be executed during a 7-year period and is expected to begin during the first semester of 2021.

Project lifespan. The period for which project benefits will accrue is 30 years.

Methodology. Each activity presents a breakdown of tasks and items that were costed with unit costs and quantities year by year. Activities are aggregated by project's outputs and outcomes.

Unit costs. Unit costs have been calculated in US dollars, excluding taxes and including price and physical contingencies, and they are based on field visits, consultations with FAOJO Procurement Office and other recent external funded project's references (REGEP additional financing- IFAD) where FAO/DPI provided technical support. It is noted that all unit costs are indicative and are used for the purposes of estimating the overall project costs. These are, therefore, subject to verification during project implementation at the time of preparing Annual Work Plans and Budgets every year.

¹ Annex 4. Detailed budget plan (template provided)

² Annex 5. Implementation timetable including key project/programme milestones (template provided)

³ Annex 10. Procurement plan (template provided)

⁴ Annex 3 Economic and/or financial analyses in spreadsheet format.

Exchange rate. The exchange rate of 0.71 JOD/USD has been used for costing, based on Central Bank of Jordan⁵ current exchange rate and IMF forecast⁶. The Jordanian dinar (JOD) has been pegged to the USD since 1995, when the country adopted a fixed exchange rate system Dinar/US Dollar as the nominal pillar of the monetary policy⁷.

Expenses Accounts. Each budget line was categorized under both FAO expenses and transactional accounts (Columns 1 and 2) aligned with current GCF cost categories (8) (Column 3). The following list shows the expenditure accounts used for each financier and the alignment proposed by the PB Tool.

Table 1 FAO⁸ and GCF alignment between expenses accounts and cost categories

1.Expense_Account	2.FAO transaction accounts	3.GCF cost categories
5300 Salaries Professional	5011 Salaries Professional	Staff
5500 Salaries General Service	5012 Salaries General Service	Staff
5542 Consultants - Internationally-recruited	5013 Consultants	International Consultants
5543 Consultants - Locally-recruited	5013 Consultants	Local Consultants
5650 Contracts	5014 Contracts	Professional/ Contractual Services
5660 Locally contracted labour	5020 Locally contracted labour	Contractual Services
5900 Travel - Duty	5021 Travel - Duty	Travel
5920 Training & workshops	5023 Training & workshops	Training, workshops, and conference
6000 Expendable Equipment	5024 Expendable Equipment	Equipment
6100 Non Expendable Equipment	5025 Non Expendable Equipment	Equipment
6150 TSS (staff only)	5027 Technical Support Services	Staff
6150 TSS (other costs)	5027 Technical Support Services	Others
6300 General Operating Expenses	5028 General Operating Expenses	Others

Project Management Costs (PMC) rules and caps. The BRCCJ Project Costing complies with the GCF rules and caps concerning PMC⁹, as mentioned in the PMC rules in the PB tool developed by FAO. The ones applicable to the current project are the following:

- Consider only eligible incremental Costs incurred due to GCF contribution;
- The amount should be up to 5% for a funding proposal over USD 3 million,
- The percentage of PMC financed by GCF should not be more than the percentage share of the overall budget financed by GCF.
- The PMC should be shown as a separate Component in the project budget. A detailed breakdown and explanation of the components of the PMC should be provided.

Besides, PMC costs are being equally cost-shared by Project financiers (non-official rule). Next section's table 7 shows the compliance to GCF PMC rules.

⁵ <http://www.cbj.gov.jo/>

⁶ IMF Country Report No. 19/127, May 2019.

⁷ <http://www.cbj.gov.jo/Pages/viewpage.aspx?pageID=260>

⁸ <http://intranet.fao.org/csd/csf/acct/> and http://intranet.fao.org/fileadmin/templates/faomanual/Projects_NEW/OPERATIONAL_GUIDELINES_AND_RESOURCES/Result_s_Based_Budget/Guidelines_for_the_preparation_of_budgets.pdf

⁹ GCF Policy for PMC

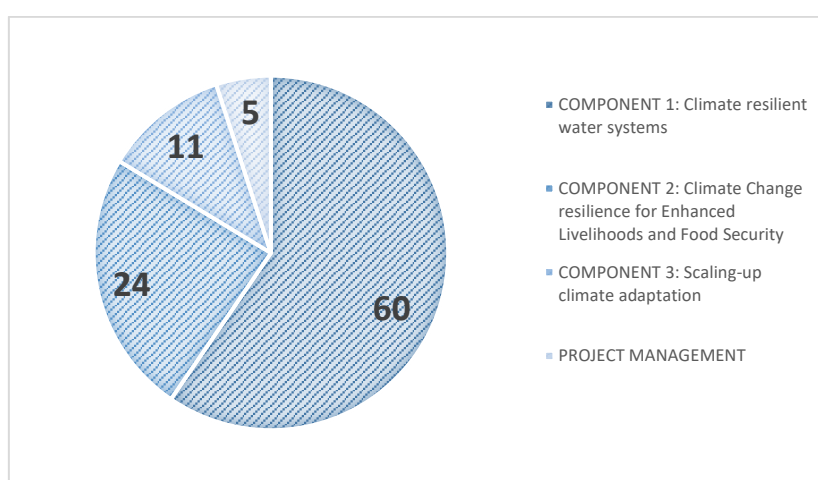
Taxes and duties. Taxes and duties have been exempted in the unit cost estimates. Given the current VAT level at 16% (income tax and sale tax department), Tax exemption¹⁰, that applies for all goods and services to be purchased by the project, is estimated at USD 4.14 million. This is not included in the project budget.

2.2 Summary of Project's main cost tables

Total Costs. Total Project costs over the seven-year period are estimated at USD 33,25 million (JOD 23,57 million¹¹), including contingencies and excluding taxes and duties.

Costs by Component/Outcomes. Component 1: Climate Resilient Water Systems, comprises 60% of total costs; Component 2: Climate change resilience for enhanced livelihoods and food security comprises 24%; Component 3: Scaling-up climate adaptation is estimated at 11% of total project costs and Project Management comprises 5%. As there is one outcome per component, the same distribution applies to the Cost by Outcome.

Figure 1. Costs by Component (%)



¹⁰ As referred in the Tax Exemption Letter applicable for all United Nations Organizations in Jordan including FAO (RC/2019/21).

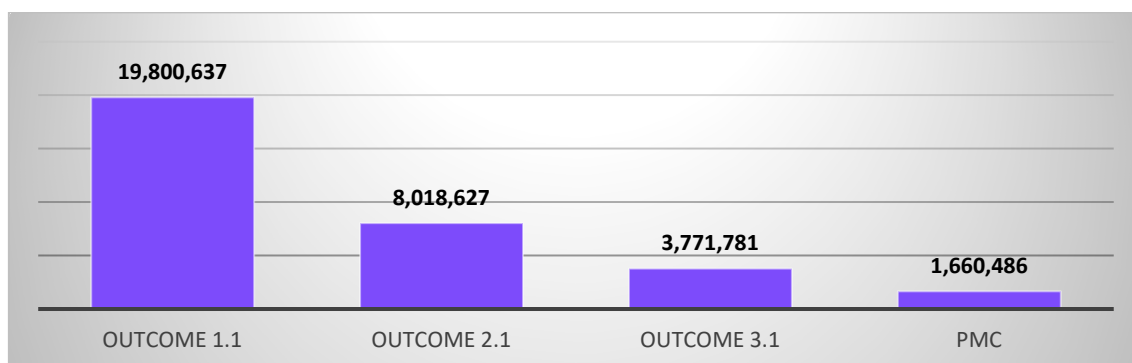
¹¹ Considering a exchange rate of 0.71 USD/JOD as referred in the above in the assumptions.

Table 2. Project Costs and Financing by Component and Output (GCF and Others¹²)

Component	Output	Indicative cost USD	GCF financing		Co-financing		
			Amount USD	Financial Instrument	Amount USD	Financial Instrument	Name of Institutions
COMPONENT 1: Climate resilient water systems	Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures	14,351,749	11,553,405	Grants	485,000	In-kind	UNDP
					2,205,000	In-cash	Government (MWI)
					108,344	In-kind	Government (MWI)
	Output 1.1.2 By year 7, reuse of reclaimed water from 3 Waste Water Plants is optimized	3,585,700	2,151,700	Grants	1,434,000	In kind	Government (MWI)
	Output 1.1.3 By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin	1,863,188	1,163,201	Grants	500,000	In-kind	UNDP
					199,987	In kind	Government (MWI)
COMPONENT 2: Climate Change resilience for Enhanced Livelihoods and Food Security	Output 2.1.1 By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (1950)	5,466,025	3,900,425	Grants	275,000	In kind	FAO
					1,290,600	In kind	Government (MoA)
	Output 2.1.2 By year 7, 30 000 Farmers reached through e-extension	823,600	50,000	Grants	573,600	In kind	Government (MoA)
					200,000	In-kind	FAO
	Output 2.1.3 By year 3, 400 Women trained as Change Agents for Climate Adaptation	980,250	880,250	Grants	100,000	In-kind	FAO
	Output 2.1.4 By year 7, 15,000 Persons sensitized for climate adaptive measures	748,752	748,752	Grants	-		
COMPONENT 3: Scaling-up climate adaptation	Output 3.1.1. By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated	2,383,280	2,108,280	Grants	275,000	In kind	FAO
	Output 3.1.2 By year 6 at least 6 national curricula of vocational schools (masonry, plumbery and agriculture) and of specialized universities (agriculture, architecture, water engineering) are updated to include climate smart agriculture, water efficiency and precision agriculture.	625,000	550,000	Grants	75,000	In kind	FAO
	Output 3.1.3 By year 7 at least 6440 persons (4 governorates, 16 provinces, 324 municipalities) and private sector engaged in climate change adaptation practices	763,501	763,501	Grants	-		
Project Management		1,660,486	1,130,486	Grants	75,000	In kind	FAO
					75,000	In kind	UNDP
					380,000	In kind	Government (MoE)
Indicative total cost (USD)		33,251,531	25,000,000		8,251,531		

¹² BRCCJ Funding Proposal, Section C2.

Figure 2. Costs by Outcome (USD)



Costs by Output. Project costs are divided in ten outputs. Three in Component 1, four in Component 2 and other three in Component 3. The following list shows the Outputs per component:

Table 3. List of outcomes, outputs and indicators

Component	Outcome	Output	Indicator	
Component 1	1.1	Output 1.1.1	By year 7 at least 8250 buildings retrofitted with water harvesting structures	43%
Component 1	1.1	Output 1.1.2	By year 7, reuse of reclaimed water from 3 Waste Water Plants is optimized	11%
Component 1	1.1	Output 1.1.3	By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin	6%
Component 2	2.1	Output 2.1.1	By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (6000)	16%
Component 2	2.1	Output 2.1.2	By year 7, 30 000 Farmers reached through e-extension	2%
Component 2	2.1	Output 2.1.3	By year 3, 400 Women trained as Change Agents for Climate Adaptation	3%
Component 2	2.1	Output 2.1.4	By year 7, 15.000 Persons sensitized for climate adaptive measures	2%
Component 3	3.1	Output 3.1.1	By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated	7%
Component 3	3.1	Output 3.1.2	By year 6, at least 6 national curricula of vocational schools and specialized universities updated to include climate smart agriculture, water efficiency and precision agriculture	2%
Component 3	3.1	Output 3.1.3	By year 7 at least 6440 persons (4 governorates, 16 provinces, 324 municipalities) and private sector engaged in climate change adaptation practices	2%
PMC	PMC	PMC	PROJECT MANAGEMENT	5%

Figure 3. Costs by Output (%)

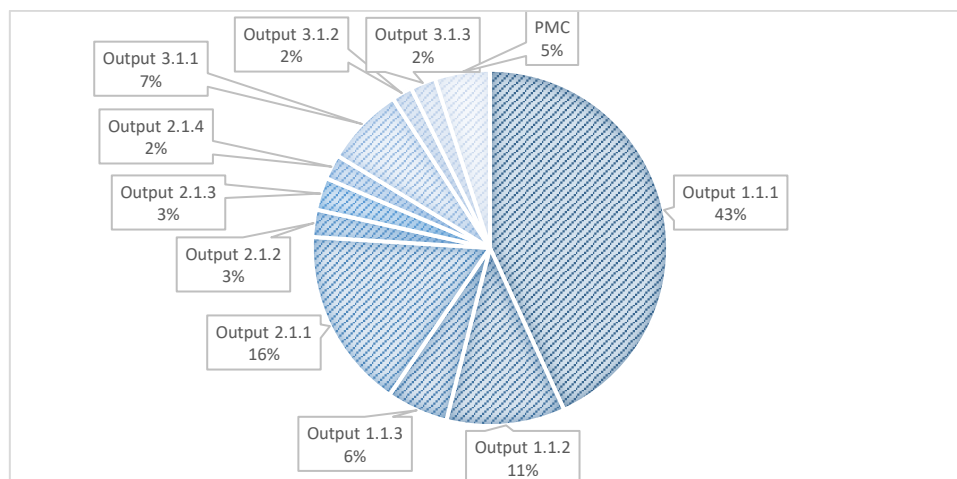
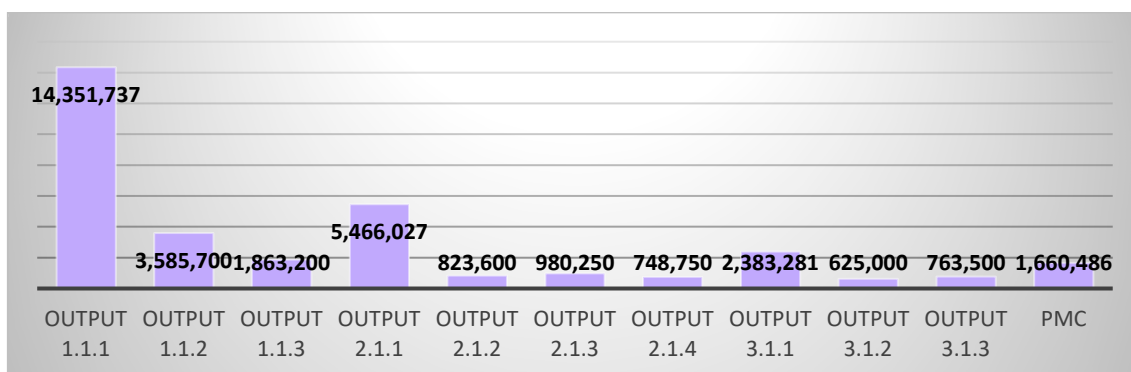


Figure 4. Costs by Output (USD)



Costs by Expense Account. Project expense accounts are being aligned between financiers as it was shown in Table 1. The following graphics shows the distribution among expenses accounts (excluding FAO and UNDP financing).

Figure 5. Costs by Expense Account (%)

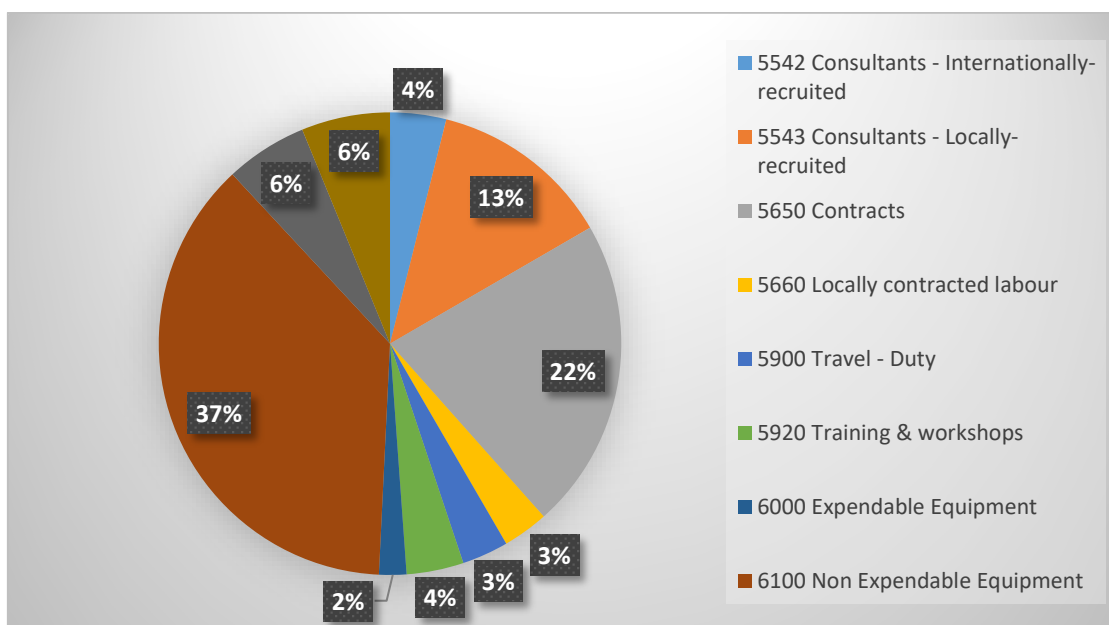
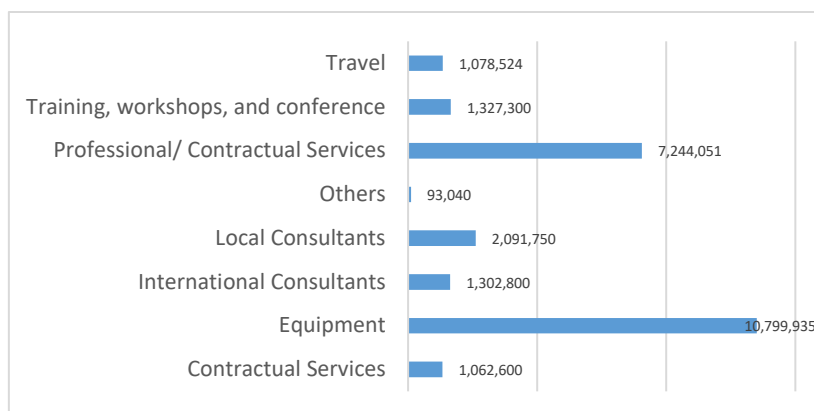


Figure 6. Allocation of GCF financing among GCF cost categories (USD)



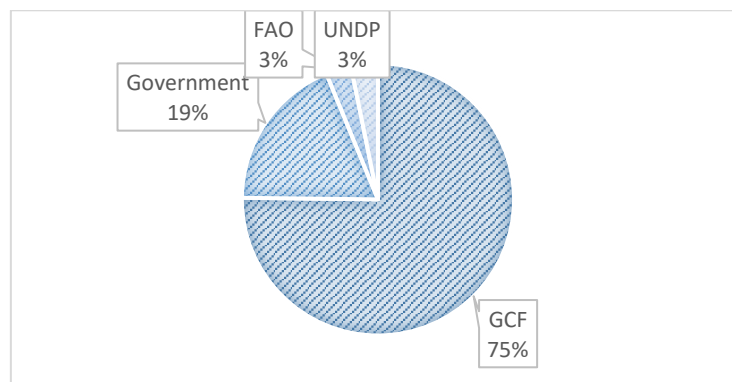
Project Financing

The current project is based on a request for a grant from the GCF. Total project costs are estimated at USD 33.25 million. The budget for the project comprises a GCF grant of US\$ 25 million (75% of total project cost), Government of Jordan contribution of US\$ 6.2 million (19%), and FAO and UNDP co-financing of USD 2.06 million (1 million and 1.06 million respectively, representing 6% of total costs). Beneficiaries are expected to provide USD 4.6 million (as an investment in roof-top water harvesting systems and water saving devices and gadgets for domestic water conservation) which is not accounted as co-finance in the project budget.

Government will be providing use of its staff and facilities for the implementation of project activities as well as budget support for some of the roof-top harvesting from its Capital Investment Plan. The Government will also exempt all purchased goods and services, even those directly imported such as vehicles and equipment from taxation for the project. This exemption, that is not considered as co-finance in the project budget, is estimated at USD 4.14 million. On an annual basis the MWI invests around JOD 29 million (USD 40.84 million) as its capital investment in the water sector, some of it will be for direct investments in capital investments in the selected project Governorates.

It is expected that all participating households will contribute by purchasing gadgets and water saving devices for domestic use valued at close to USD 785,000 as well as direct contribution for roof top water harvesting at around USD 3.83 million.¹³ This is a key element to ensure sustainability and ownership among targeted beneficiaries. Total beneficiary contribution is expected at around USD 4.62 million.

Figure 7. Costs by Financer (%)



There are other Investments in the area of adaptation by several donors in the country complementing the project interventions, such as:

- FAO and UNDP both have on-going projects which are making climate adaptation investments through the MADAD project, investments in aquaponic and hydroponics, etc.
- UNDP is assisting the Government with developing plans for drought management.
- The Adaptation Fund of the UNFCCC (2016-2020) is investing USD 9.2 million in substitution of fresh water with wastewater for specific purposes. It is also assisting in developing and testing innovative solutions to implement participatory water management.
- IFAD is investing (2021- 2025) USD 15.2 to integrate climate resilient agriculture in selected value chains.
- AFD and KFW are investing Euro 450 million in a Water Sector Policy Loan which includes diffusion of water harvesting and distribution technology.
- GIZ is investing USD 2 million for removing barriers to Climate Change Adaptation in the water and agriculture sector. Thus, there is considerable parallel financing for climate adaptation.

¹³ The average cost for a household to install the water efficient devices is expected to be USD 100 per hh (7,850) and for public buildings (400) it is expected that the cost will be USD 200.

The following table shows GCF financing per Component:

Figure 8. GCF contribution by Component (USD million)

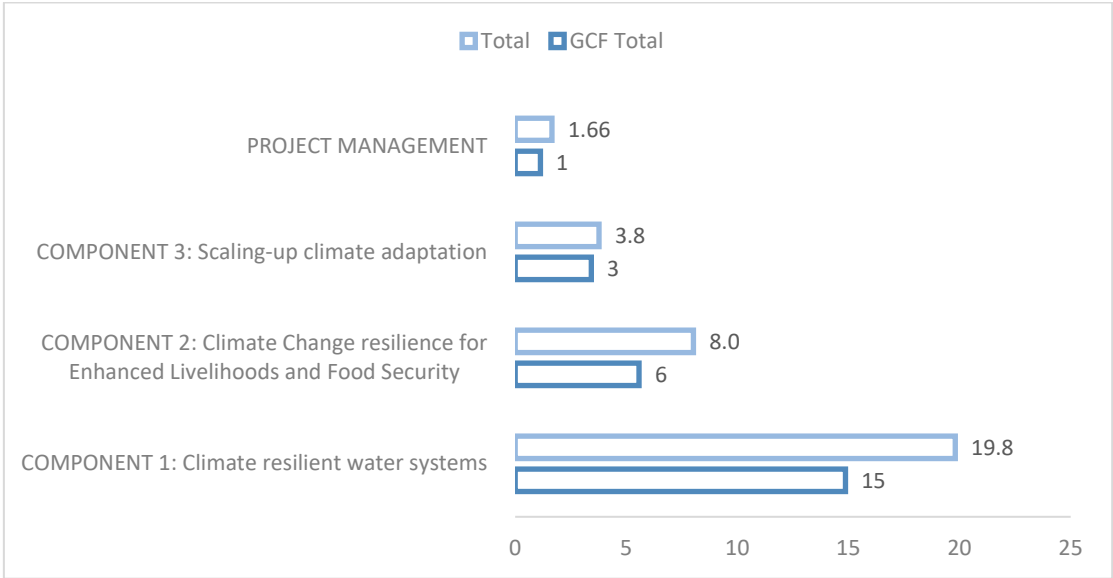
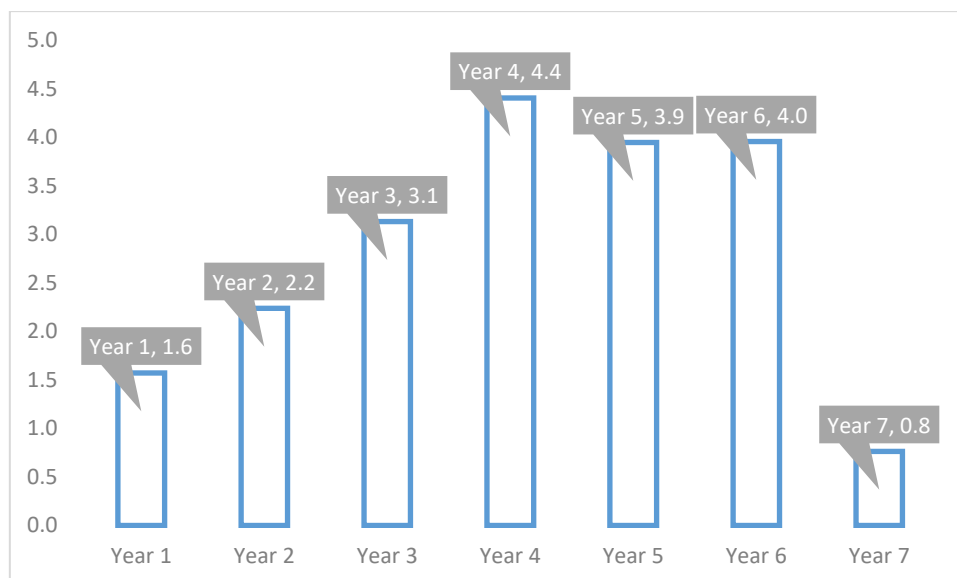


Table 4. Project Costs and Financing by Component and Output

Preliminary Costs per Component per financier	GCF		Government		FAO		UNDP		Total	
	USD MM	%	USD MM	%	USD MM	%	USD MM	%	USD MM	%
COMPONENT 1: Climate resilient water systems	14.9	75	3.9	20	-	-	1.0	5	19.8	60
Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures	11.6	81	2.3	16	-	-	0.5	3	14.4	72
Output 1.1.2 By year 7, reuse of reclaimed water from 3 Waste Water Plants is optimized	2.2	60	1.4	40	-	-	-	-	3.6	18
Output 1.1.3 By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin	1.2	62	0.2	11	-	-	0.5	27	1.9	9
COMPONENT 2: Climate Change resilience for Enhanced Livelihoods and Food Security	5.6	70	1.9	23	0.6	7	-	-	8.0	24
Output 2.1.1 By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (1950)	3.9	71	1.3	24	0.3	5	-	-	5.5	68
Output 2.1.2 By year 7, 30 000 Farmers reached through e-extension	0.1	6	0.6	70	0.2	24	-	-	0.8	10
Output 2.1.3 By year 3, 400 Women trained as Change Agents for Climate Adaptation	0.9	90	-	-	0.1	10	-	-	1.0	12
Output 2.1.4 By year 7, 15.000 Persons sensitized for climate adaptive measures	0.7	100	-	-	-	-	-	-	0.7	9
COMPONENT 3: Scaling-up climate adaptation	3.4	91	-	-	0.4	9	-	-	3.8	11
Output 3.1.1. By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated	2.1	88	-	-	0.3	12	-	-	2.4	63
Output 3.1.2 By year 6 at least 6 national curricula of vocational schools (masonry, plumbers and agriculture) and of specialized universities (agriculture, architecture, water engineering) are updated to include climate smart agriculture, water efficiency and precision agriculture.	0.6	88	-	-	0.1	12	-	-	0.6	17
Output 3.1.3 By year 7 at least 6440 persons (4 governorates, 16 provinces, 324 municipalities) and private sector engaged in climate change adaptation practices	0.8	100	-	-	-	-	-	-	0.8	20
PROJECT MANAGEMENT	1.13	68	0.38	23	0.1	5	0.1	5	1.66	5
Total	25.0	75	6.2	19	1.0	3	1.1	3	33.25	100

Costs by year. The following chart illustrate the expected project costs by year.

Figure 9. Project Costs by year (USD million)



Capacity Building and Technology Transfer

The total GCF financing for capacity building and technology transfer is estimated at USD 18.117.283 or 72% of the total GCF funding. The key technology transfer aspects (USD 15.78 million) that will be promoted through the project include the dissemination of technologies such as roof-top water harvesting and adaptation technologies for the agriculture sector. Capacity building financed by GCF (USD 2.938 million) landscape planning for MWI including the preparation of technical, economic and social feasibility studies. Training for MoA staff on extension approaches that enhance adoption rates, women climate change agents, students and private sector in understanding how to improve their technical capacity and skills for delivering services and technologies that help farming communities and households to become more resilient. Table 1 below identifies the volume of financing in each component that is allocated for capacity building and technology transfer from the total budget and GCF.

Table 5. Total Budget and GCF financing of Capacity Building and Technology Transfer

	Total Amount (USD)	Capacity Building (USD)	%	Technology Transfer (USD)	%	Total Amount (USD)	Capacity Building (USD)	%	Technology Transfer (USD)	%
Component 1	\$ 19,800,637	\$ 1,708,188	9	\$ 13,616,749	69	\$ 14,868,306	\$ 1,508,201	10	\$ 11,303,405	76
Component 2	\$ 8,018,627	\$ 880,250	11	\$ 5,739,625	72	\$ 5,579,427	\$ 880,250	16	\$ 3,875,425	69
Component 3	\$ 3,771,781	\$ 550,000	15	\$ -	-	\$ 3,421,781	\$ 550,000	16	\$ -	-
PMU	\$ 1,660,486	-	-	-	-	\$ 1,130,486	-	-	-	-
Total	\$ 33,251,531	\$ 3,138,138	9	\$ 19,356,374	58	\$ 25,000,000	\$ 2,938,451	11.75	\$ 15,178,830	61
Total GCF Capacity Building and TT							\$18,117,281			

Compliance with Project Management Costs (PMC) rules and caps.

The following table shows the project's compliance with the PMC rules described in Section 2.1.

Table 6. Compliance with GCF PMC rules

Item	Current Costs	Rule
PMC/Total	4.99%	5% Cap
GCF PMC/GCF Total	4.52%	5% Cap
% GCF/Others Total PMC and overall total	68.1% (GCF financing /PMC) is lower than 75.2% (GCF financing /overall total)	% GCF/Others in PMC lower than % GCF/Others in overall costs

Additionally, a cost-sharing scheme of PMC costs is being proposed following the project's financing plan:

Table 7. PMC cost-sharing and total cost sharing

	Total Share (%)	PMC Share (%)
GCF	75	68
Government	19	23
FAO	3	5
UNDP	3	5

Costs by implementing agency.

FAO and UNDP will be the executing agencies. UNDP will be focused on implementing Outputs 1.1.1 and 1.1.3 (Outcome 1.1), FAO will be in charge of all the others outcomes, outputs and activities.

Table 8. GCF financing per implementing agency

Costs per Output per implementing agency- GCF funding	FAO		UNDP		Total GCF funding	
	USD Million	%	USD Million	%	USD Million	%
COMPONENT 1: Climate resilient water systems	5.82	39	9.04	61	14.9	59
Output 1.1.1	3.7	32	7.88	68	11.55	78
Output 1.1.2	2.15	100	-	-	2.15	14
Output 1.1.3	-	-	1.16	100	1.16	8
COMPONENT 2: Climate Change resilience for Enhanced Livelihoods and Food Security	5.58	100	-	-	5.58	22
Output 2.1.1	3.90	100	-	-	3.90	70
Output 2.1.2	0.05	100	-	-	0.05	1
Output 2.1.3	0.88	100	-	-	0.88	16
Output 2.1.4	0.75	100	-	-	0.75	13
COMPONENT 3: Scaling-up climate adaptation	3.42	100	-	-	3.42	14
Output 3.1.1.	2.11	100	-	-	2.11	62
Output 3.1.2	0.55	100	-	-	0.55	16
Output 3.1.3	0.76	100	-	-	0.76	22
PROJECT MANAGEMENT	1.13	100	-	-	1.13	5
Total (USD Million)	15.96	64	9.04	36	25.00	100

Table 9. UNDP budget

Activities to be implemented by UNDP - Outcome-Output-Activity		
Outcome 1.1	\$	9,043.985
Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures	\$	7,880.785
<i>Activity 1.1.1.4 Select beneficiaries, provide orientation on water conservation to households</i>	\$	1,800.000
<i>Activity 1.1.1.5 Construction of Rooftop rainwater harvesting system in households</i>	\$	6,080.785
Output 1.1.3 By year 4. Landscape Resilience Investment Plan for part of the Dead Sea Basin	\$	1,163.200
<i>Activity 1.1.3.1 Establish plan objectives and criteria</i>	\$	263.200
<i>Activity 1.1.3.2 Execute technical, economic, environmental and social feasibility studies</i>	\$	800.000
<i>Activity 1.1.3.3 Disseminate and validate investment Plan</i>	\$	100.000
Total	\$	9,043.985

Government Contribution per Component.

Government will contribute in Component 1, Component 2 and Project Management Costs. Ministry of Water and Irrigation (MWI) will be in charge of contributing to Component 1 costs. Ministry of Agriculture (MoA) will contribute to Component 2 and Ministry of Environment (MoE) will contribute with the Project Management Costs.

Table 10. Government contribution per activity (USD)

Co-financing Breakdown	USD	%
Component 1	\$ 3,947,331	64%
Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures	\$ 2,313,344	37%
Activity 1.1.1.3 Construction of Rooftop rainwater harvesting system in public buildings	\$ 125,344	2%
Water saving equipments and devices	\$ 40,000	
Staff time (MWI)	\$ 85,344	
Activity 1.1.1.5 Construction of Rooftop rainwater harvesting system in households	\$ 2,188,000	35%
Government Scaling-up Construction of Rooftop rainwater harvesting systems in households	\$ 2,080,000	
Staff time (MWI)	\$ 108,000	
Output 1.1.2 By year 7, reuse of reclaimed water from 3 Waste Water Plants is optimized	\$ 1,434,000	23%
Activity 1.1.2.1 Build storage and distribution infrastructure to maximize reuse of reclaimed water from existing WWT plants	\$ 1,434,000	23%
Operation and Maintenance cost by the MWI	\$ 1,434,000	
Output 1.1.3 By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin	\$ 199,987	3%
Activity 1.1.3.1 Establish plan objectives and criteria	\$ 100,000	2%
Staff time (MWI)	\$ 100,000	
Activity 1.1.3.2 Execute technical, economic, environmental and social feasibility studies	\$ 99,987	2%
Staff time (MWI)	\$ 99,987	
Component 2	\$ 1,864,200	30%
Output 2.1.1 By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (1950)	\$ 1,290,600	21%
Activity 2.1.1.4 Identify target groups in Project Area	\$ 81,000	1%
Local consultant to develop the targeting criteria and identify groups in Project Area	\$ 81,000	
Activity 2.1.1.6 Conduct Climate Smart FFS	\$ 1,209,600	20%
Extensionists mobilized	\$ 1,209,600	
Output 2.1.2 By year 7, 30 000 Farmers reached through e-extension	\$ 573,600	9%
Activity 2.1.2.2 Disseminating climate smart-solutions and weather forecast through smart devices	\$ 573,600	9%

Staff time (MoA)	\$ 302,400	
Studio	\$ 120,000	
System O&M	\$ 151,200	
PROJECT MANAGEMENT	\$ 380,000	6%
Office rent and utilities	\$ 97,998	
Operating support MoE	\$ 282,002	
Total Government Co-financing	\$ 6,191,531	100%

Due to the limited fiscal space that the Government has and its reluctance to borrow additional finance given its high debt ratio, the project does not impose any additional financial burden on the Government: a) 66% of the Government's expected co-financing for the project is in-kind and entails using its existing facilities and staff, promoting the Farmer Field School approach and innovative e-extension technologies to avoid overcharging the extensionist Staff; b) Government's direct contribution (estimated at USD 2.1 Million in a seven year period, mainly for the scaling-up of rainwater harvest rooftops in C2) is already part of the MWI Investment Plan for 2016-2025; c) there is no any other direct financial contribution from the GoJ which could have placed an additional fiscal burden on. On the contrary, water saving generated by the project is expected to reduce the burden of the water subsidies in the country. The following table illustrates the different contributions per agency per activity.

Table 11. Government Contribution by Ministry

Ministry	USD	
MWI	3.947.331	64%
MoA	1.864.200	30%
MoE	380.000	6%
Total	6.191.531	100%

Distribution of GCF Costs per Results Area (GCF Funding Proposal Section A4).

The project will contribute to the following Climate Change Adaptation results areas:

- Most vulnerable people, communities and regions (R1) with 19% of total GCF amount; and
- Health and well-being, and food and water security: Infrastructure and built environment (R2) with 81% of the total GCF amount.

The following table illustrates the expected distribution between each result area:

Table 12. GCF financing per Result Area

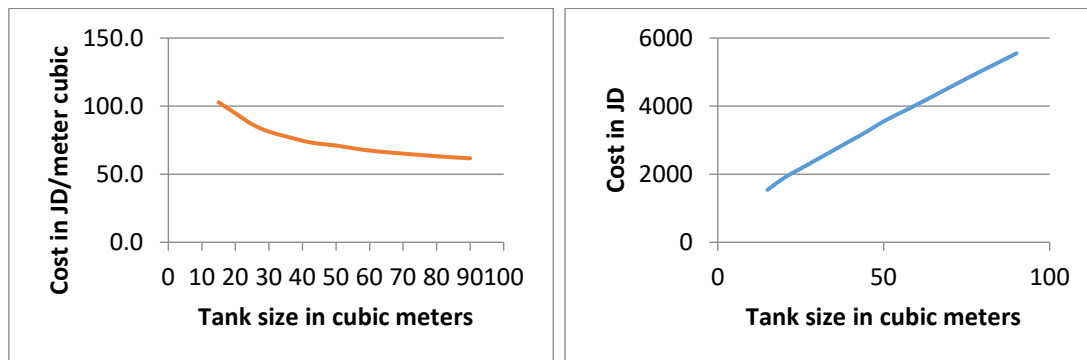
GCF Contribution (USD Million)			Adaptation		Total
Results Area			1	2	
C1	100%	R1		14.87	14.87
C2	50%	R1/R2	2.79	2.79	5.58
C3	50%	R1/R2	1.71	1.71	3.42
PMC*	19%/81%	R1/R2	0.21	0.92	1.13
*Following the Component's resulting distribution			4.71	20.29	25.00
			19%	81%	100%

Key unit costs. Unit costs for workshops, trainings, salaries, per diems, local consultants' fees, vehicles, office utilities, insurance, office equipment, publication, communication and studies were provided by FAOJO Procurement Office and double-checked with other project's recent estimates (as IFAD-REGEP Additional Financing).

Key unit costs for Component 1 were provided by a local water engineer specialist, verified with water engineer international consultants in the team. Costs of Rainwater Harvest System are based on unit cost

per cubic meter of the tanks provided by Abdulla (2019)¹⁴ depending on the size of tanks per governorate and considering two different rooftop areas and the annual rainfall for private and public buildings. The following graphic shows the unit cost per cubic meter of tank selected depending on the size of the tank (Abdulla, 2019). It ranges from 60 USD/m³ (for tank sizes beyond 65m³) and 100 USD/m³ (for tank sizes between 5 and 10m³). This unit cost includes materials (steel, concrete, pipes, pumps, steel gate, plastering and isolation) and excavation and labor costs for the construction¹⁵. Cost of water saving devices are estimated at 100 USD¹⁶ (Abdulla; 2020). Other Key Costs in Component 1, as the Wastewater Treatment Plants storage ponds to be maximized and Operation and Maintenance costs, were assessed by water engineer specialists in the team based on the information provided by the Ministry of Water and Irrigation, Ma'an and Madaba WWTP during field visits, double-checked with Kelpasaite (2016).

Figure 10. Unit cost per cubic meter and tank size (Key costs in C1)



Source: Abdulla; 2019.

Key costs in Component 2 were estimated using NARC and other project's references (REGEP) (for farmers field schools). Costs in Component 3 were estimated under the basis of the proposed contracts to be prepared with service providers year by year to implement the group of activities proposed.

2.3 Additional detailed cost tables

The following cost tables describe the Project's M&E Budget and the technical, administrative and management positions.

Table 13. M&E budget

Outcome	Ouput	Activity	Item	Total budget	Financier
Outcome 1.1	Output 1.1.1	Activity 1.1.1.1	M&E officer	168.000	GCF
			M&E Specialist	252.000	GCF
			Allowances M&E Officer and Specialist	37.800	GCF
			Mid-term and final surveys	80.000	GCF
			Knowledge management products and studies	40.000	GCF
			Monitoring equipment	11.400	GCF
			IT / Software equipment and trainings	42.780	GCF
			Communication campaigns, traslations and multimedia	37.500	GCF
		Activity 1.1.1.6	Contracting a service provider to conduct the independent impact assessment	250.000	GCF
Outcome 2.1.	Output 2.1.1	Activity 2.1.1.1	Social inclusion and gender Specialist	175.000	FAO
			M&E officer	168.000	GCF
			Allowances M&E Officer	29.400	GCF
			Mid-term and final surveys	80.000	GCF
			Knowledge management products and studies	40.000	GCF
			Monitoring equipment	7.600	GCF
			Communication campaigns, traslations and multimedia	37.500	GCF

¹⁴ Abdulla, F. A. (2019), Rainwater harvesting in Jordan: potential water saving, optimal tank sizing and economic analysis, Urban Water Journal, DOI:10.1080/1573062X.2019.1648530

¹⁵ Steel bar 14 mm at 20 cm in two layers for side walls, bottom and top, Steel cost 600JD/ton
Concrete thickness 20-25 cm, Concrete cost 60JD/m³, Pipes 2JD/m, Excavation cost (4-6 JD/m³), One, pump 40 JD, Steel gate 25 JD, Plastering and isolation 5 JD/m², Labor 8 JD/m³

¹⁶ And it includes faucet (5) at 6 USD per unit, shower heads (8) at USD 2 per unit and toilet boxes (55) at 1 USD per unit.

		Activity 2.1.1.5	International Consultant to develop the monitoring system and App	95.000	GCF
			Travel International Consultant	21.600	GCF
			Trainings of M&E experts. Extensionists and Farmers groups on the use of the App	26.400	GCF
			Equipping the extension Staff with smart devices and software	36.000	GCF
			Communication. traslations and multimedia	10.500	GCF
		Activity 2.1.1.8	Contracting a service provider to conduct the independent impact assessment	250.000	GCF
Outcome 3.1	Output 3.1.1.	Activity 3.1.1.1	ES safeguard specialist	175.000	FAO
			Allowances of ES safeguard specialist and others	76.734	GCF
			Communication campaigns. traslations and multimedia	45.000	GCF
PMC			Office equipment	35.000	GCF
			FAO technical assistance to the PMU	75.000	FAO
			UNDP technical assistance to the PMU	75.000	UNDP
			Project Manager	378.000	GCF
			Procurement Specialist	231.000	GCF
			Finance Manager	252.000	GCF
			Administrative Assistance	109.200	GCF
			Support Staff	92.400	GCF
			Travel-Field per diems PMU key Staff	32.886	GCF
			Office rent and utilities	98.000	GVT
			Operating support MoE	282.000	GVT

Table 14. Management, Technical and Administrative positions

Outcome	Ouptut	Activity	Positions	Total budget	Financier
C1/Outcome 1.1	Output 1.1.1	Activity 1.1.1.1	M&E officer	168.000	GCF
			M&E Specialist	252.000	GCF
			Water Engineer Specialist	294.000	GCF
			Technical Advisor- Focal Point from MoE	252.000	GCF
C2/Outcome 2.1.	Output 2.1.1	Activity 2.1.1.1	Social inclusion and gender Specialist	175.000	FAO
			Agronomist and Climate change adaptation Specialist	294.000	GCF
			M&E officer	168.000	GCF
C3/Outcome 3.1	Output 3.1.1.	Activity 3.1.1.1	ES safeguard specialist	175.000	FAO
			P4 consultant position with allowances / 26 days per month	982.800	GCF
PMU			Project Manager	378,000	GCF
			Procurement Specialist	231,000	GCF
			Finance Manager	252,000	GCF
			Administrative Assistance	109,200	GCF
			Support Staff	92,400	GCF

3. Project Economic and Financial Analysis

3.1 Introduction to EFA analysis

The economic and financial analyses consist of comparing the resources required for the project implementation (represented in overall costs) with the expected impacts, calculated as benefits for the main promoted activities. It is done from the point of view of each participant (financial analysis) but also aggregating beneficiaries per model and estimating economic benefits of key investments (such as rainwater harvesting systems) for the entire project.

The methodology used follows the guidelines to measure Economic Analysis in Agricultural projects (Gittinger;1985) applying the requirements and steps proposed for Economic and Financial Analysis by different donors as ADB (2013), IFAD (2019) for Volume 2 and IFAD (2015) for Volumes 1 and 3.

The financial analysis provides further understanding of beneficiaries' motivations, based on hypothesis and parameters. It permits to figure out if targeted farmers would be able to take the risks that the project requires. This exercise implies to simulate benefits at the individual level but also make sure that they will have the means to implement project investments, taking into account assumptions on the delays in adopting technologies and reaching full development.

The economic analysis takes into account all the costs and benefits of the Project. It will allow to evaluate the global efficiency in management resources for the government and the society as a whole. The analysis aggregates the farm models using economic prices and adding other source of benefits due to the water savings for Component 1 activities.

Both in the financial and economic analyses, each initiative will be considered profitable if cash flow's additional benefits, over a 20-year period for financial models and 30-year period for the economic analysis, surpass investment and recurrent costs at a cut-off rate. As a result, profitability indicators will be the Net Present Value (NPV, economic and financial), the Internal Rate of Return (IRR, economic and financial-when applicable-) and the Benefit-costs ratio (B/C) and increase in returns to family labor (for the financial analysis). The sensitivity analysis will test vulnerability or robustness of obtained results for the economic profitability indicators.

A 20-year timespan is considered for the stream of benefits from climate change adaptation activities involving agricultural techniques and practices in Component 2 and a 30-year timespan was selected for water access infrastructure in Component 1 based on Abdulla (2019) for Water Harvesting Systems and Albert, J et Al (2013) where it is being mentioned that *"water infrastructure projects are designed to deliver services and associated benefits for 20 to 50 years..."* (analyzing the investments in Wastewater Treatment Plants). While financial benefits are calculated using a time-span tailored to each type of financial, Economic benefits and aggregation were calculated taking into consideration the longest timespan period of economic models (and farming models benefits are being considered only in a 20-year timespan in order to be aligned with financial estimates).

The following chart illustrates the EFA Roadmap where financial models are then converted into economic models and, together with water saving investments, aggregated to get total expected additional benefits of the project.

Table 15. EFA roadmap



Food and Agriculture
Organization of the
United Nations



GREEN
CLIMATE
FUND



The Hashemite Kingdom of Jordan: Building Resilience to Climate Change in Jordan (BRCCJ)

Economic and Financial Analysis

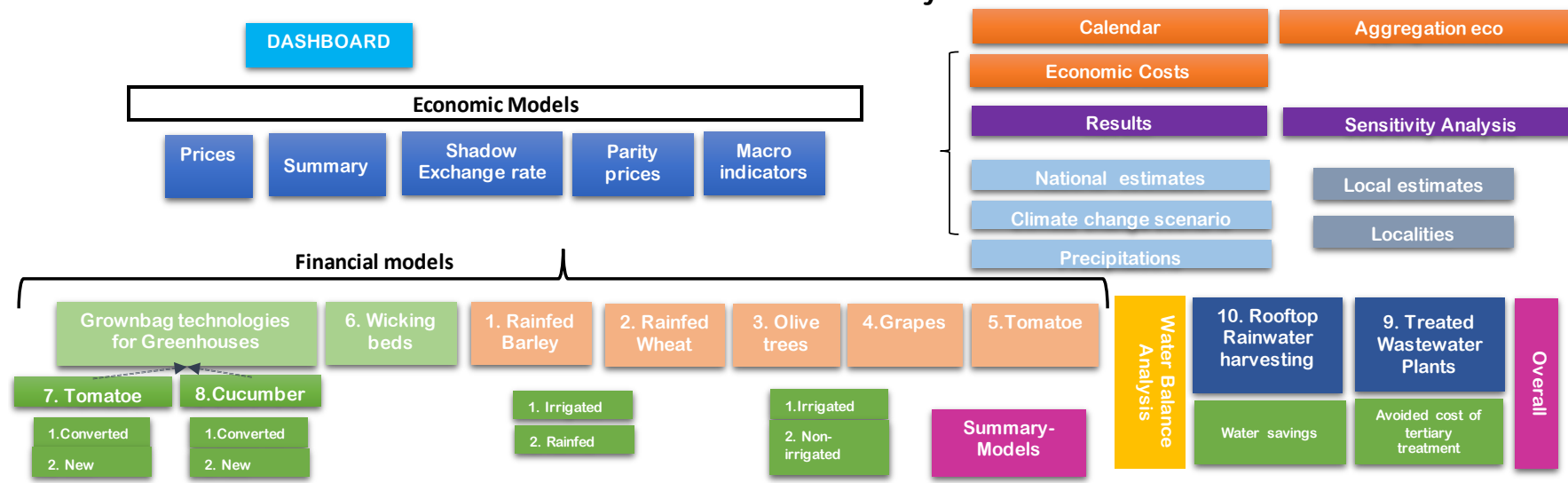
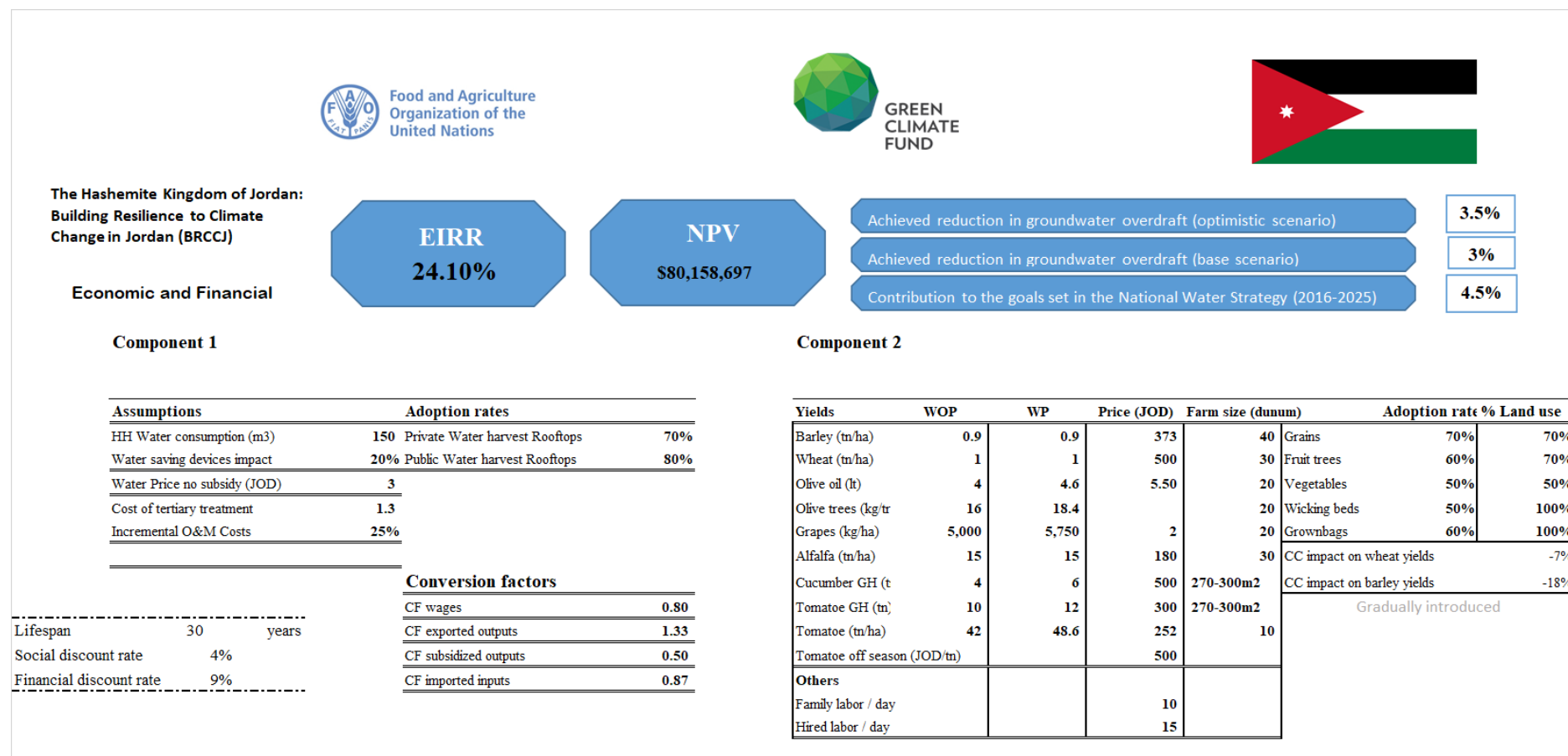


Table 16. EFA Main Results and Assumptions- Dashboard



The first part of the document summarizes the impact potential, sources of project's benefits. Therefore, financial analysis will analyze assumptions and hypothesis of the proposed models and the corresponding expected benefits. In the end, economic analysis assumptions will be described and aggregated benefits (with externalities included) will determine the overall profitability and the sensibility of results in face of negative shocks affecting costs, prices and yields such as floods and draughts.

3.2 Impact potential, key activities and sources of benefits

The project will make vulnerable households who suffer from water scarcity and livelihood vulnerability more resilient in facing the negative impacts of climate change. In particular, the project will focus on women and help to empower them to deal with climate risks and leverage their role as agents of change. The project has the potential to achieve two of the most significant fund level impacts namely; (i) increased resilience and enhanced livelihoods of the most vulnerable people, communities and regions; and (ii) increased resilience of health and well-being, and food and water security.

The project's specific outreach and fund level impacts are expected to include the following;

- 212.416 people-of which 47% will be direct and indirect women beneficiaries made aware of climate threats and related appropriate responses.
- In the project area, the project is expected to benefit about 10% of the target population in the selected Governorates in the Dead Sea Basin and 2.1% of Jordan's total population (PMF-A Core 1).
- 20.550 men and 9.220 women benefitting from the adoption of diversified, climate resilient livelihood options (PMF.A.1.2)
- 57.910 men and 28.212 women with year-round access to reliable and safe water supply despite climate shocks and stresses (PMF A 2.3)

The Fund Level Outcomes Expected from the project include the following;

- At least six discrete policy and regulatory measures introduced for the water and agriculture sectors which provide an incentive for climate resilience from which about 167.818 people (82.902 women) nation-wide are expected to benefit (PMF-A.5.1).
- Increased use of climate information in water and agriculture sectors (PMF-A.6.1).
- 30.000 household use climate smart mobile application or Information Communication Technology for Climate Adaptation (ICT4CA) (PMF-A..1)
- 94.943 men and 39.914 women from vulnerable households, communities, businesses and public-sector services use Fund-supported tools instruments, strategies and activities to respond to climate change and variability (PMF-A.7.1).
- 135.623 men and 57.020 women made aware of climate threats and related appropriate responses (PMF-A.8.1).
- At least 6 technologies introduced for climate adaptation of which 5 are useful for women. (PMF-ACrC1).

Other project level impacts are the following:

- 54.143 people will have enhanced water availability to address climate change risks (outcome 1) and 55.050 people with enhanced capacity to deal with climate change (outcome 2)
- At least 50.000 of the most vulnerable people will have increased resilience and enhanced livelihoods will have increased resilience and food security
- 6.000 farmers trained in climate resilient practices in the project area (output 2.1)
- At least 10.600 hectares of agricultural land will be strengthened with climate-adaptive measures in the project area.
- 30.000 farmers reached through e-extension with climate-smart solutions and weather forecast (output 2.2) and 15.000 people will be sensitized for climate adaptive measures (output 2.4)
- 194.258 people will be benefited from the mainstreaming in the institutional and regulatory systems of resilient tools and practices to adapt to water scarcity. This includes national and local policy, administrative, educational and social frameworks.

At least 400 climate wise-women trained as change agents for climate adaptation to involve in innovate adaptation practices and run their own businesses or being employed in the future (as (e-)extensionists or agricultural inputs and service providers among other possible business opportunities emerging from their involvement in FFS and their collaboration with private sector.

The current analysis builds-up on the impact potential of key activities and technologies to be scaled-up in the project area. The following table presents the EFA models prepared per activity, given the proven impact potential. The next table provides more detail on models and references used to build main hypothesis and assumptions.

Table 17. Summary of Key activities and climate change adaptation impacts

Level	Activity	Impact potential	Baseline	Impact	EFA models
Household level	Activities 1.1.1.3 1.1.1.5	Household massive adoption of water saving technologies	Low use of water saving technologies at the household level Low investment in water harvest infrastructure at the household level	<ul style="list-style-type: none"> Water deficit reduction (national and per governorate) Reduction in Public Bill related to water subsidies Reduction in household expenses / Increase in water consumption in households <ul style="list-style-type: none"> Economic empowerment of women Improved food security in home-gardens 	10
Farm level	Activities 2.1.1.6 2.1.1.7	Farmer's adoption of climate resilient practices and NARC proven technologies	Low understanding of climate change patterns, impacts and adaptation measures Extended use of chemical fertilizers and/or pesticides/fungicides Over-water of crops, low knowledge of water saving techniques	<ul style="list-style-type: none"> Better understanding of how temperature increase and uncertain rainfall patterns, affect the growing season and how to adjust cropping practices by shifting the crop planting and harvesting calendars Use of draught-resistant seed varieties Water saving technologies for Greenhouses (Grown-bags) Tailored technologies to promote women economic empowerment and their involvement in agriculture such as Wicking beds techniques for Vegetable production. Reduced use of chemical fertilizers and pesticides 	1,2,3a,3b, 4, 5, 6, 7a, 7b, 8a, 8b
	Activity 1.1.2.1		Use of groundwater / purchases of water for agricultural irrigation	<ul style="list-style-type: none"> Encourage use of reclaimed water for irrigation of fodder and limited crops. 	9.1 9.2
Landscape level	Activities 1.1.3.1 1.1.3.2 1.1.3.3	Key investments in reduction of floods, maximizing ground water recharge, reduction in soil erosion	Low capacity to identify key investment areas to enhance resilience to extreme climate events Lack of understanding of suitable sites and lack of strategic planning	<ul style="list-style-type: none"> Promote the use of landscape investment plans Enhance capacity of planning at the level of the hydrological basin with benefits to the downstream areas 	-

The following table presents the breakdown of expected direct beneficiaries per component per activity.

Table 18. Breakdown of project beneficiaries

Component 1	Units	People	Women
Roof-Top water harvesting public buildings	municipal staff and students	10.000	5.000
Roof-Top water harvesting at homes	citizens	43.175	21.328
Waste Water Treatment plants	farmers	968	
		54.143	26.328
Component 2			
FFS Climate -Smart	farmers	4.050	1.200
Persons reached through E extension	farmers	30.000	10.000
Farmer Field Days	farmers	6.000	1.800
Climate Wise Women	women		400
Persons sensitized to climate adaptive measures	people	15.000	10.500
		55.050	23.900
Component 3			
Policy in the agriculture sector	farmers	167.818	82.902
Climate Smart Agriculture in Universities	students	5.000	1.500
Climate Smart Agriculture in Vocational Institutes	students	14.000	4.200

Local Engagement and Dissemination	citizens	4.800	2.400
Engagement of Local administration	municipal staff	640	192
Engagement of private sector	private sector	1.000	100
Civil Society Organizations	CSO staff, CBOs and Community Members	1.000	500
		194.258	91.794
Total		303.451	142.023
Reduced by 30% to compensate for double counting	Adjusted total	212.416	99.416

GCF Funding Proposal
Table 19. Activities, EFA models, targets and sources of benefits

	Activity	Intervention	Model	Targets (# farmers)	Targets (ha)	Source of benefit	References
Component 1	Activity 1.1.1.3 Construction of Rooftop rainwater harvesting system in public buildings	Water harvest Rooftops Systems and saving devices in Public Buildings (per Governorate)	10. Water Harvest Rooftops in Public and Private Buildings per Governorate	400		a. Value of water harvested from the rooftop b. Value of saved water due to the introduction of water saving devices c. Value home-garden production / Avoided expenses on vegetables	Abdulla (2019) Double-checked with DPI water engineer specialists
	Activity 1.1.1.5 Construction of Rooftop rainwater harvesting system in households	Water harvest Rooftops Systems and saving devices in Private Buildings (per Governorate)		7850		a. Value of water harvested from the rooftop b. Value of saved water due to the introduction of water saving devices	
	Activity 1.1.2.1 Build storage and distribution infrastructure to maximize reuse of reclaimed water from existing WWT plants	Optimizing wastewater treatment plants to increase reuse of reclaimed water	9.1. WWTP Farm 9.2 Reclaimed water Plants	176	528	a. Avoided cost of tertiary treatment b. Increased production of irrigated Alfalfa c. Avoided contamination in the rivers (not monetized)	Kelpasaite (2016) Albert, J., et al (2013) Hunter (2019) Analyzed with DPI water engineer specialists Massimi (2017)
Component 2	Activity 2.1.1.6 Conduct Climate Smart FFS	Promotion of Growbag technologies in Greenhouses	7.1 Converted GH- tomatoes	428	12	a. Increased resilience / increased productivity b. Reduced use of pesticides/fertilizers c. Reduced use of water	<u>NARC Regional offices</u> field visits consultations- 2020.
			7.2 New GH- tomatoes	285	8		
			8.1 Converted GH- cucumber	428	12		
			8.2 New GH- cucumber	285	8		
		Promotion of Wicking bed technologies for Women and youths	6. Wicking beds	525	-	a. Additional value of production	<u>NARC: Directorate of Socio-Economic Studies:</u> Al Hiary (2020) Document shared for the DPI/GCF mission
		Promotion of climate adaptation technologies for Fruit trees	3.1 Irrigated Olive trees	517	1033	a. Increased yields b. Improved water management c. Cost savings in inputs	Al Hiary et al (2019) MoA consultations ¹⁷ Hamdan, H (2018). NARC. FFS Component Report REGEP/IFAD
			3.2 Non-irrigated Olive trees	706	1411		
		Promotion of climate adaptation technologies for Vegetables	4. Irrigated grapes	38	76		
			5. Tomatoes	840	840		
	Activity 2.1.1.7 Field demonstration of tested climate-adaptive innovation and practices	Promotion of climate adaptive seed varieties for Grains	1. Rainfed Barley	975	3900	a. Increased resilience / Stabilization of production	Al Hiary et al (2018) Al Hiary (2015)
			2. Rainfed Wheat	975	2813		

¹⁷ Studies and Development of Production Chains Directorate, Documents shared by Director Mahmoud Rabai, February-2020

3.3 Financial Analysis

Intro. Financial profitability was assessed using twelve financial models developed taking into account the cropping pattern relevant for the project area and based on crop distribution and average size of farms per Governorate in the Agricultural Census (DoS, 2017) double-checked with Studies on the farm-types and production prevailing in the area (FAO; 2015). The analysis relies both on water saving technologies and impacts in Component 1 and improvements in climate adaptation for family farming in Component 2. The selection of crops was confirmed after consultations with NARC and MoA national and regional representatives.

Agricultural sector. As 75% of the country presents less than 200mm rain annually and only 5% to 6% of the land considered arable, the agricultural potential is limited. Primary Agriculture in Jordan represents from 3 to 4% of the GDP and crop production represents 40% of the total agricultural share. Export of agricultural products represent 25% of total Jordan's exports¹⁸.

The four Governorates in the project area (Madaba, Ma'an, Tafilah and Karak) are located in the Dead sea basin. They represent 8% of the total population and register 107.707 agricultural holdings (21% of the country's total) in 64.216 hectares (23% of the country's total). Size of farms ranges from 1.6 ha per farmer in Madaba to 5.3 ha per farmer in Ma'an. Average size is 2.8 ha. 17% of the population considers agriculture as the main source of income.

Table 20. Land use per governorate and average size of farm¹⁹

Source:	Population	Agricultural Holdings (ha)	Av. Size farm (ha)	N° Agricultural holdings	Crop area (ha)	Livestock area (ha)	Livestock&Crop area (ha)	Ag. Main Source Income
Madaba	204,300	7,928	1.6	4,899	65,845	3,790	9,645	356
Ma'an	171,100	23,452	5.3	4,406	169,069	411	65,040	408
Tafilah	104,000	5,726	1.9	3,026	36,691	591	19,976	298
Karak	341,900	27,111	2.7	10,225	162,439	2,281	106,385	1,761
Subtotal	821,300	64,216	2.8	22,556	434,044	7,073	201,046	2,823
Country	10,309,000	281,860	2.6	107,707	2,204,111	61,705	552,781	16,477
%	8%	23%		21%	20%	11%	36%	17%

Source: Agricultural Census 2017 Tables 1.1, 1.2, 2.16 and 2.17 (DoS; 2017)

Selection of Crops. Field crops represent 70% of total Land use in the four Governorates, followed by Fruit trees (19%) and vegetables (11%). Almost 68.4% of fruit trees area is irrigated. Crops selection was made taking into consideration the economic competitiveness²⁰ of related agri-food value chains (based on high-yield revenue crops and high crop water productivity) and the availability and scalability of climate-adaptive technologies for the main existing crops in the region. The distribution of models was made given their importance in the total area and production per governorate. Wheat and Barley were selected for the open field crops, Olive trees (irrigated and non-irrigated) and grapes for fruit trees, and tomatoes for vegetable production. Finally, Tomato and Cucumber were selected for the Greenhouses. The following table present the share of those crops per Governorate based on the Agricultural Census (DoS; 2017) and MoA official data:

¹⁸ Leeters et al (2016). Export Value Chain Analysis Fruit and Vegetables Jordan. Netherlands Enterprise Agency.

¹⁹ www.dos.gov.jo/dos_home_e/main/agriculture/census/

²⁰ FAO (2015) Water along the food chain in Jordan. FAO Investment Centre. FAO/EBRD Cooperation.

Table 21. Key crops area per governorate (I)²¹

Governorate	Share of Wheat and Barley / Total Field Crops			Share of Olives and grapes / Fruit trees			Share of Tomato and Cucumber / Vegetables		
	Area	Production (tn)	Av. Yield (tn/ha)	Area	Production	Av. Yield (trees/ha)	Area	Production	Av. Yield (tn/ha)
Madaba	99%	73%	0.9	94%	85%	176	46%	71%	45
Karak	97%	67%	0.81	90%	64%	186	60%	62%	37
Ma'an	95%	20% ²²	1	57%	8% ²³	277	57%	53%	43
Tafilah	100%	100%	0.9	94%	91%	151	60%	65%	44

Source: Agricultural Census 2017 Tables 6.1, 6.4, 6.5 (DoS; 2017)

Table 22. Key crops area per governorate (II)²⁴

Governorate	Barley (ha)		Wheat (ha)		Olive trees		Irrigated trees	Non-I trees	Grapes	
	Irrigated	Non-I	Irrigated	Non-I	Irrigated area	Non-I area			Irrigated	Non-I
Madaba	41	1,837	98	1,327	322	1,796	44,533	328,334	125	587
Ma'an	184	4,506	535	2,165	1,172	48	329,484	9,460	438	2
Tafilah	125	1,552	32	248	304	471	57,779	58,974	239	442
Karak	563	14,188	9	2,847	795	1,471	159,659	261,980	885	192
Subtotal	913	22,083	674	6,587	2,592	3,786	591,455	658,748	1,687	1,223
Country	2,086	54,372	1,640	10,551	21,382	34,832	5,466,894	5,067,468	23,084	5,855
%	44%	41%	41%	62%	12%	11%	11%	13%	7%	21%

Source: Agricultural Census 2017 Tables 6.1, 6.4, 6.5 (DoS; 2017)

EFA Models. EFA models also considered the need of a rational allocation of water resources for agricultural production and increasing pressure on groundwater resources. Consequently, the expected solutions (with-without) were driven by the impact on crop water values (promoting cropping with greater returns per unit of water used and transforming agriculture with high water demand and low value). Several studies analyzed this issue²⁵ with recommendations on reducing water allocation in open field crops or tree crops with low water value rates. Besides, prices are highly subsidized for those crops. At the same time, they suggest that water-efforts should be focused on allocating water for vegetables production (mainly off-season / winter months, when water values are higher).

Out of the twelve models developed, four of them represent a new technology to be introduced in the Greenhouses (new/converted and tomato /cucumber). Three of them are related to fruit trees (Olive trees-irrigated and non-irrigated and irrigated grapes) and tomatoes are considered for vegetable production. One model of a micro-basket container of mixed vegetables is developed for the wicking bed technology (specially for women) and one additional model was developed for the reclaimed water farmers that turns their rainfed barley farms with irrigated alfalfa (with reclaimed water). Only two models represent wheat and barley production (highly predominant within the farmers) aiming to reduce the water stressors and not necessarily increasing yields.

Concerning wastewater use for farming, reclaimed water can be only used for Category C crops in accordance with Jordanian standards. Category C crops include field crops, industrial crops and forest trees. No fruit trees will be grown because the effluent does not meet the standard for category B crops. The Ministry of Agriculture, Ministry of Health and MWI conduct random inspections at the wastewater treatment plants to check this. The selected crop for modelling (Alfalfa) is based on consultations during field visits. Farmers insights on profitability and returns were verified comparing a model of rainfed barley with wastewater irrigated alfalfa (as it is the most profitable option allowed among crops in Category C). Market opportunities can be found in selling alfalfa for livestock farmers.

²¹ www.dos.gov.jo/dos_home_e/main/agriculture/census/²² A cluster of 300ha of Clover, trifoliolate explains 76% of total production²³ A cluster of 500 ha of apples (big-scale farms) explains 71% of total fruit trees production²⁴ www.dos.gov.jo/dos_home_e/main/agriculture/census/²⁵ Mourad et al (2010) and USAID (2010)

Climate risks and models. The project proposal in models expect to address the following climate change impacts identified on the agricultural sector:

Table 23. Climate risks and selected Crops in the EFA

Crops	Current risk	Level of risk	Consequence	Baseline/Quantified impact
Wheat and Barley	Increase in temperatures and decrease in rainfall patterns	High	Reduction in time available for assimilation of dry matter and lower water availability	decrease in yield varying from 7% to 21% for wheat and from 18% to 35% for barley due to shorter duration of crop growth ²⁶
Olive production		Medium	Reduction in oil quality	from 5% to 10% with high evidence on the oil quality reduction
Vegetables		Medium	Decrease in yields	by 5 and 10%, respectively ²⁷
Orchards		High	Less flower bud induction, higher fruit drop, faster volume growth of fruit, earlier maturation, less total soluble solids and fruit reaches insipid and dry states earlier	-

The following quantitative benefits can be summarized:

- 1.425 farmers benefiting with a 30% increase in return to family labor due to the implementation of water saving and climate-adaptive technologies (improving yields and reducing the use of water and fertilizers);
- 525 women being reached to generate at least USD 130 additional value per year through the use of the new wicking beds technologies to produce herbs and vegetable beds in small- irrigated containers;
- 1260 farmers being trained to apply improved water management and climate adaptive techniques on 2520 hectares of fruits trees with between 22% to 63% additional profit margins per hectare; and
- 1950 farmers trained to apply improved water management and climate adaptive techniques on 6713 hectares of land funder fruits trees that reports between 7% to 16% additional margins per hectare.

Over 90% of farmers sell directly to a wholesaler which is concentrated in Amman and seven municipality wholesale markets (Leeters; 2016). There are no restrictions of minimum quantity to be purchased so they are accessible also to final consumers. All the products selected under the current analysis present well-established traders and mechanisms. This partially mitigates market risks for the products that will be promoted.

Other assumptions. Financial prices were considered in the analysis. It includes government subsidies for Wheat and Barley and Water prices. Other assumptions concerning the financial analysis include the financial discount rate at 9% based on the average financial interest rates of the Central Bank of Jordan on Loans and Advances. Financial costs were also included in models. Yields were double-checked with national and regional averages (FAOSTAT and MoA data).

²⁶ Al- Bakri J.T. et al (2010), FAO (2020) and MoE (2019).

²⁷ FAO, 2012. Assessment of the risks from climate change and water scarcity on food productivity in Jordan.

Table 24. Technical specifications of crops and assumptions without and with project

Model	Main Assumptions	Project support	Baseline	With project
1.Rainfed Barley. 2.Ranfed Wheat	Av. Size of farm: 3 ha (wheat) and 4 ha (barley) Land use: 70% Outputs: Barley and Hay (1) and Wheat and Hay (2)	Technical assistance with field days and trainings	-Reduction in yields in the mid-term (18% for Barley and 7% for wheat) -Low knowledge of cost saving techniques and practices. -High rate of expected losses due to climate stress.	More stable production, evolutionary Plant Breeding allows to introduce drought-resistant seed varieties, contributing to counter the expected reduction in yields due to climate change and increasing the efficiency in the use of fertilizers in the mid-term. Conservative estimate (no increase in yields per hectare)
6. Wicking beds (micro vegetable containers)	Micro beds with 0.15 m3 per year of water requirement/ for 2 Seasons Outputs: tomato, eggplant, lettuce, mint, corn, watermelon, melon.	Promotion of Wicking bed technologies for Women and youths in FFS (Containers, pipes, elbows, fibers and mulch)	Opportunity cost of time / Other farming activities	New income generating activity with less water consumption and reduced evaporation. Rather than having to irrigate by watering from above (via drip irrigation, a hose, watering can etc.), the water literally <i>wicks</i> up into the soil from below, via a process called capillary action keeping it nice and moist ²⁸ (50% less water than traditional irrigation). Low requirement of maintenance; the problems of the undesired herbs are less because the surface of the soil is drier. It provides a source of organic and healthy food-basket at home and several crops can be planted together
7.1/7.2 and 8.1/8.2 New/Converted Greenhouses with Grow-bag technologies	Size: 270-300m2. Water requirement per year: 360m3. Land use: 100% Seasons: 2 (tomato) and 4 (cucumber) Full development in year 4 5% post-harvest Losses ²⁹	Promotion of Growbag technologies to convert / introduce Greenhouses (Iron GH bodies, Pumps, ventilation, tanks, pipes)	Traditional Greenhouse with higher water consumption and extended use of fertilizers and pesticides Opportunity cost of time / Other farming activities	Ventilation reduce impact of frosts. Major impacts in reducing water consumption (90%) and fertilizers and pesticides used (50%) ³⁰ . Yield increase at 20% (from 4 to 6 tn/ha for cucumber and 10 to 12 tn/ha in tomato)
3.1/3.2/4/5 Olive trees irrigated (3.1) and non-irrigated (3.2), Grapes (4) and Tomato (5)	Size: 2 ha (fruit trees) 1ha (tomato) Land use: 70% (fruit trees), 50% (tomato) Outputs: olive oil, grapes and tomato	Promoting FFS and e-extension to implement climate adaptation measures and practices	Conventional techniques, high dependence on external inputs and weak management of water consumption.	Improved techniques and inputs, promoting cost savings between 10% and 30% and 15% increase in yields ³¹ . (from 5 to 5.75 tn/ha in grapes 4 to 4.6 tn/ha in olives (irrigated) and 16 to 18 kg/tree (non-irrigated).
9.1 Irrigated alfalfa	Size: 3 ha. Land value analysis is not included Outputs: rainfed Barley to irrigated Alfalfa	Training and improved access to finance for ice-cost reduction and increase in value -addition	Climate change impacts negatively affect yields for rainfed fodder. Farmers already have ponds and in-farm infrastructure to receive reclaimed water.	No need of fertilizers with reclaimed water use. Salinization causes a 2% loss in production each year. Groundwater contamination through excess nutrients and heavy metals cancels out effect of avoided downstream contamination-15tn/ha of alfalfa

²⁸ NARC working paper; 2020.

²⁹ NARC Tafilah, Extension Staff consultations.

³⁰ NARC Tafilah Extension Staff, Field tests, DPI Mission- February 2020

³¹ Al Hiary (2019), REGEP FFS Report (2018) and MoA assessment and field consultations

Financial Results. Profitability results can be found in the table below. Overall, all models show positive Net Present Values (NPV) and Financial Internal Rate of Return (FIRR) ranging from 17.5% to 63.9% and net present values (NPV) that vary from JOD 179 to JOD 14,668 (USD 252 to USD 20,659). Consequently, all models are considered profitable, Additionally, expected increases in returns to family labour range from 19% to 317%.

Table 25. Financial Profitability indicators per model

Item	FIRR %	NPV JOD	(%) incremental Returns to Family Labour
Rainfed Barley	17.5%	205	162%
Rainfed Wheat	18.7%	212	85%
Olive trees irrigated	n/a	4,594	317%
Olive trees non-I	n/a	3,139	35%
Grapes irrigated	n/a	10,346	25%
Tomatoes	n/a	12,945	26%
Wicking beds	21.9%	179	61%
Grow-bag GH Tomatoes converted	48%	11,666	19%
Grow-bag GH Tomatoes (new)	30.3%	6,807	46%
Grow-bag GH Cucumber converted	63.9%	14,668	37%
Grow-bag GH Cucumber (new)	36.4%	7,558	45%
Alfalfa	n/a	4,004	262%

Table 26. Financial Results per model

Item	Unit	Models											
		Rainfed Barley	Rainfed Wheat	Olive trees	Olive trees	Grapes irrigated	Tomatoes	Wicking beds	Grownbag GH	Grownbag GH	Grownbag GH	Grownbag GH	Alfalfa
Without Project													
Costs	JOD	282	419	3,563	2,614	7,929	7,850		4,917		7,085		282
Sales	JOD	351	600	3,850	2,944	10,000	10,651		5,700		7,600		345
Margins	JOD	69	182	287	330	2,071	2,801	-	783	-	515	-	63
With Project	JOD												
Costs	JOD	274	390	3,573	2,621	8,127	7,850	6	8,449	7,589	9,896	7,664	1,595
Sales	JOD	393	600	3,985	3,025	11,500	12,249	97	11,400	11,400	11,400	11,400	2,700
Margins	JOD	119	210	411	404	3,373	4,399	92	2,952	3,812	1,504	3,736	1,105
%		72	16	43	22	63	57	n/a	277	n/a	192	n/a	1,655
FIRR	%	17.5%	18.7%	n/a	n/a	n/a	n/a	21.9%	48%	30%	64%	36%	n/a
NPV	JOD	205	212	4,594	3,139	10,346	12,945	179	11,666	6,807	14,668	7,558	4,004
% Increase in Return on family labor	N°												
		162%	85%	317%	35%	25%	26%	61%	19%	46%	37%	45%	262%

Impacts on household incomes. Baseline annual income of the targeted HHs is presented in the following table per Governorate:

Table 27. Average total income by source per HH per year per Governorate (JOD)

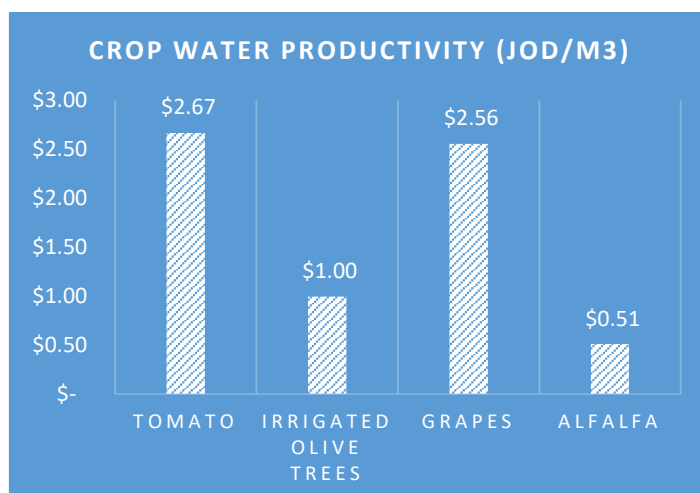
Governorate and Urban\ Rural	Source of Income					
	Average Total Income	Transactions Incomes	Property Incomes	Rentals Incomes	Incomes from Own Private Work	Income from Employment
Madaba	10413.9	3710.1	6.0	1558.3	736.0	4403.4
Karak	11755.3	4877.3	9.8	1230.1	785.7	4828.1
Tafila	10133.2	3414.6	36.7	1245.4	514.8	4921.7
Ma'an	9575.9	3374.8	50.9	1299.8	515.1	4334.5
Urban\ Rural						
Urban	11406.1	3817.5	104.1	1936.9	1020.0	4525.9
Rural	9951.5	3780.4	15.9	1268.8	668.2	4211.8
Kingdom	11241.9	3813.3	94.1	1861.5	980.3	4490.5

Source: Amer (2020) and Department of Statistics\ Household Expenditures & Income Survey (2017)

However, focus will be made on poor and vulnerable households. Household incomes poverty line is estimated at JD 800 per person per year maximum and JD 67 per month (and the av. size of HH is 5.5-5.67). This gives a poverty line below 5000 in all cases. Expected increases in HH incomes are estimated between 15% for the average total incomes and 35% on average for the vulnerable HH.

Crop water productivity measures. The following graphic presents the project's estimates of Crop Water Productivity (CWP) measures as defined by Van der Berg (2016).

Table 28. Crop water productivity measures



Source: Own elaboration based on EFA models and double-checked with Haddadin (2010) parameters for m3 required per crop

3.4 Economic Analysis

Intro. The economic analysis aggregates the farm models using economic prices and adding other source of benefits due to the water savings for Component 1 activities. The following section describes the assumptions for Component 1 models and the aggregation, to get the economic profitability results.

Economic Benefits in Component 1.

Three additional flow of economic benefits taken from key activities in Component 1 are incorporated to the financial model's aggregation from Component 2 interventions. The project will carry out the installation of rooftop rainwater harvesting structures and water saving devices for households and public buildings. This activity will build climate resilience through improved access to water and efficient water use at the household level and in selected public buildings such as schools, mosques, municipalities for wider dissemination and awareness of the technology at the local community level. It is expected that 400 public buildings and 7,850 households will be fitted with the roof top water harvesting structures. The households which benefit from the investment will be expected to contribute part of the costs based on criteria that favours women-headed households, refugee and poor households, those reliant solely on agriculture, hhs with a person with disability and more than six dependents. Women will be consulted on designing water outlets as the primary users of domestic water.

Economic benefits are obtained from valuating water savings estimates considering a) official rainfall estimates³² and b) different tank and rooftop sizes per Governorate. The following assumptions were considered:

Graphic 1. Rainfall historical ranges (Earthmap)

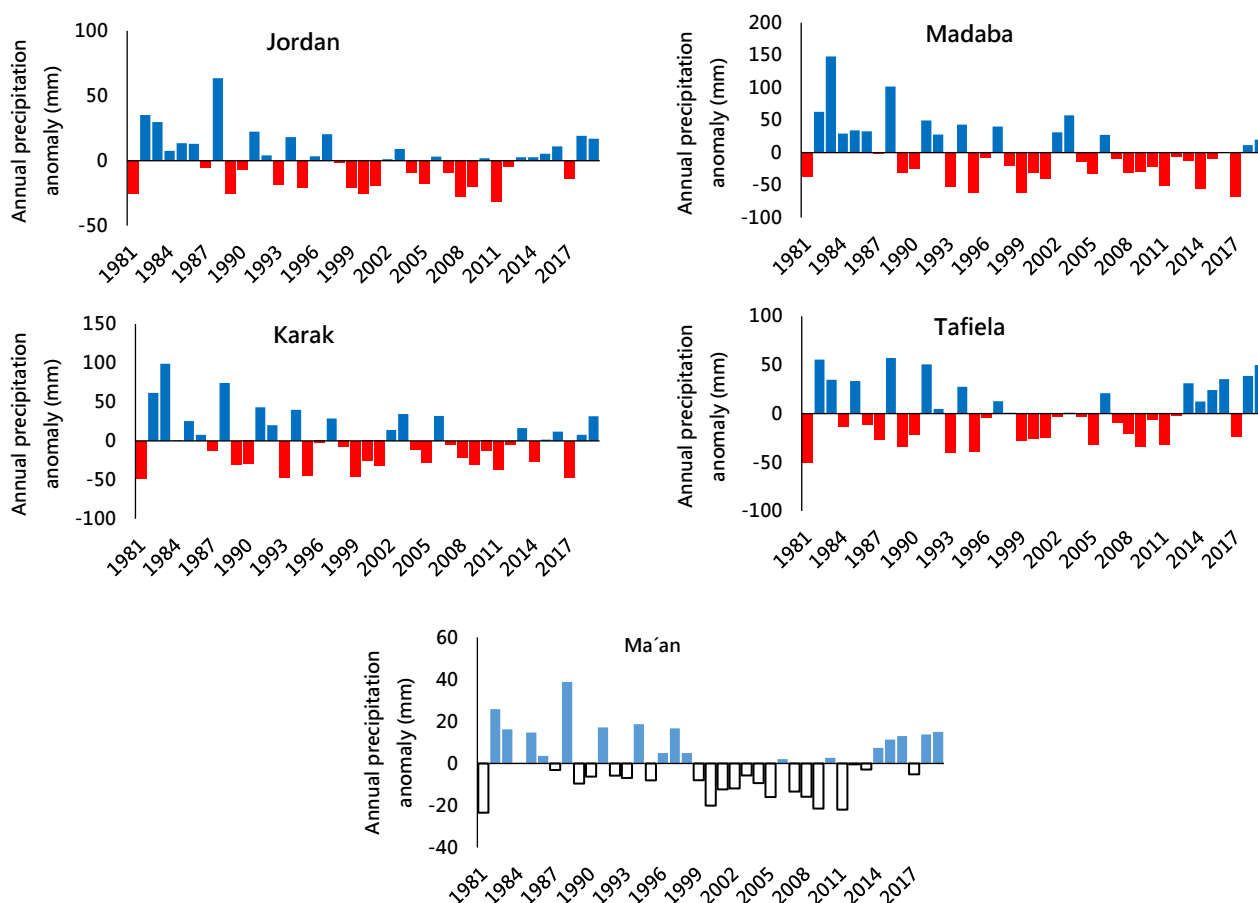


Table 29. Runoff estimation (Earthmap)

Madaba

Karak

Tafielah

Maan

³² Earthmap

Rainfall [mm]	Runoff [m]	Rainfall [mm]	Runoff [m]	Rainfall [mm]	Runoff [m]	Rainfall [mm]	Runoff [m]
218.90	0.18	183.2	0.1	162.4	0.1	84.0	0.1
320.3		349		242		43	
Roof Areas	Rainfall harvested [m3]	Roof Areas	Rainfall harvested [m3]	Roof Areas	Rainfall harvested [m3]	Roof Areas	Rainfall harvested [m3]
25	4.38	25	3.7	25	3.2	25	1.7
50	8.76	50	7.3	50	6.5	50	3.4
75	13.13	75	11.0	75	9.7	75	5.0
100	17.51	100	14.7	100	13.0	100	6.7
150	26.27	150	22.0	150	19.5	150	10.1
175	30.65	175	25.7	175	22.7	175	11.8
200	35.02	200	29.3	200	26.0	200	13.4
225	39.40	225	33.0	225	29.2	225	15.1
250	43.78	250	36.6	250	32.5	250	16.8
275	48.16	275	40.3	275	35.7	275	18.5
300	52.53	300	44.0	300	39.0	300	20.1
325	56.91	325	47.6	325	42.2	325	21.8
350	61.29	350	51.3	350	45.5	350	23.5
375	65.67	375	55.0	375	48.7	375	25.2
400	70.05	400	58.6	400	52.0	400	26.9
425	74.42	425	62.3	425	55.2	425	28.5
450	78.80	450	66.0	450	58.5	450	30.2
475	83.18	475	69.6	475	61.7	475	31.9
500	87.56	500	73.3	500	65.0	500	33.6

Under this basis, water saving estimates are the following:

Table 30. Tank sizes and potential water savings per system (household and public buildings) per Governorate (Source: Abdulla; 2019 and Earthmap)

Tank size and potential saving per Roof Area		Madaba	Karak	Tafilah	Maan
Private	Tank size for a Rooftop of 100m2	15	15	10	5
	Potential saving (m3)	32	34	25	22
	Tank size for a Rooftop of 200m2	30	30	25	10
	Potential saving (m3)	45	47	36	30
Public	Tank size for a Rooftop of 500m2	88	73	65	34
	Potential saving (m3)	130	137	102	86

Two sizes of Rooftop were considered for the household rainwater harvest systems and the distribution is 60% for the lower tank size and 40% for the higher tank size. Implementation of water saving devices contribute with an additional water saving of 20% of the Household average consumption per year (estimated at 150m3).

All systems were considerably profitable given the economic price of water at 3 JOD/m3³³. The following results were obtained per system:

³³ Abdulla (2019).

Table 31. Profitability results per system per Governorate

Ma'an	HH Rooftops 100m2 (60%)	NVP @4%	\$3,625		
		EIRR	78.5%		
		Ratio B/C	8.54		
	HH Rooftops 200m2 (40%)	NVPVc	\$481		
		NPVb	\$4,105		
		breakeven benefits	-88%		
	Public Buildings	breakeven costs	754%		
		NVP @4%	\$3,776		
		EIRR	34.0%		
		Ratio B/C	4.93		
	Public Buildings	NVPVc	\$962		
		NPVb	\$4,737		
		breakeven benefits	-80%		
	Public Buildings	breakeven costs	393%		
		NVP @4%	\$4,207		
		EIRR	15.5%		
		Ratio B/C	2.63		
	Public Buildings	NVPVc	\$2,583		
		NPVb	\$6,790		
		breakeven benefits	-62%		
		breakeven costs	163%		

Karak	HH Rooftops 100m2 (60%)	NVP @4%	\$4,700		
		EIRR	29.6%		
		Ratio B/C	4.43		
	HH Rooftops 200m2 (40%)	NVPVc	\$1,370		
		NPVb	\$6,070		
		breakeven benefits	-77%		
	Public Buildings	breakeven costs	343%		
		NVP @4%	\$4,789		
		EIRR	18.8%		
		Ratio B/C	3.08		
	Public Buildings	NVPVc	\$2,308		
		NPVb	\$7,096		
		breakeven benefits	-67%		
	Public Buildings	breakeven costs	208%		
		NVP @4%	\$2,912		
		EIRR	6.8%		
		Ratio B/C	1.37		
	Public Buildings	NVPVc	\$7,904		
		NPVb	\$10,816		
		breakeven benefits	-27%		
		breakeven costs	37%		

Tafiah	HH Rooftops 100m2 (60%)	NVP @4%	\$3,905		
		EIRR	34.2%		
		Ratio B/C	5.06		
	HH Rooftops 200m2 (40%)	NVPVc	\$962		
		NPVb	\$4,867		
		breakeven benefits	-80%		
	Public Buildings	breakeven costs	406%		
		NVP @4%	\$4,156		
		EIRR	19.4%		
		Ratio B/C	3.16		
	Public Buildings	NVPVc	\$1,923		
		NPVb	\$6,079		
		breakeven benefits	-68%		
	Public Buildings	breakeven costs	216%		
		NVP @4%	\$2,168		
		EIRR	6.8%		
		Ratio B/C	1.37		
	Public Buildings	NVPVc	\$5,885		
		NPVb	\$8,053		
		breakeven benefits	-27%		
		breakeven costs	37%		

Madaba	HH Rooftops 100m2 (60%)	NVP @4%	\$4,542		
		EIRR	28.6%		
		Ratio B/C	4.31		
	HH Rooftops 200m2 (40%)	NVPVc	\$1,370		
		NPVb	\$5,912		
		breakeven benefits	-77%		
	Public Buildings	breakeven costs	331%		
		NVP @4%	\$4,631		
		EIRR	18.3%		
		Ratio B/C	3.01		
	Public Buildings	NVPVc	\$2,308		
		NPVb	\$6,939		
		breakeven benefits	-67%		
	Public Buildings	breakeven costs	201%		
		NVP @4%	\$5,212		
		EIRR	11.4%		
		Ratio B/C	2.03		
	Public Buildings	NVPVc	\$5,051		
		NPVb	\$10,264		
		breakeven benefits	-51%		
		breakeven costs	103%		

Table 32. Expected expected incremental economic benefits per Governorate for C1- Activities 1.1.1.4/5

[illegible]

The distribution between Governorates was selected under the basis of the total population per Governorate for Households and the total number of Schools for Public Buildings.. Additional benefits are calculated aggregating the economic incremental benefits per system and considering adoption rates at 70% for private buildings and 80% for public buildings under a lifespan of 30 years, with a economic discount rate at 4%³⁴.

Wastewater Treatment Plants. The second group of activities in Component 1 (linked to Output 1.2) comprises regulation, storage and distribution of hydraulic structures to be built to maximize use of reclaimed water from the Wastewater Treatment Plants in Madaba, Karak, and Tafilah. This will enhance climate resilience at the farm level by providing additional water to grow crops in accordance with Jordan's Water Substitution and Reuse Policy (2016) and will reduce the impacts of wastewater treatment effluents on the ecosystem. MWI has certified its commitment to undertake the operation and maintenance of the storage and distribution infrastructure that will be built to maximize the use of the reclaimed water. The project will assist the MWI and the MoA in establishing / strengthening WUAs among farmers that are or will be connected to reclaimed water sources. WUAs will be supported in establishing key administrative task as well as clear O&M plans and costing among users. The project will also support WUAs in ensuring transparency and rational water sharing rights among farmers and in establishing rules and applications forms to allow possible enlargements of the network to additional subscribers.

Economic benefits were calculated considering the following sources: a) Avoided cost of tertiary treatment of reclaimed water (based on methodology and calculations for the As Samra Wastewater Treatment Plant Feasibility Study and other sources³⁵), b) additional value of production per Plant.

Cost of tertiary treatment was considered 30% more expensive than the cost of wastewater treatment (0.25 USD/m³). This was aggregated considering the additional amount of water provided. Investment costs were assessed by water engineer specialists and Incremental Operation and Maintenance costs were considered at 25% of total O&M costs. O&M costs vary widely depending on treatment system used. For example, for As-Samra, Kelpasaite (2016) reports recurring costs of 0.08 JD/m³, while ACWUA gives a range between 0.03 to 0.68 JD/m³, with an average of about 0.2 JD/m³ (ACWUA, 2011). For this study, we use an average cost of 0.25 JD/m³, which was given during our field visit to the Madaba WWT Plant.

Three wastewater treatment plants are considered to upgrade the storage and distribution capacity:

³⁴ Considering the average rate between the Jordan's 10yr bond yields (at 5.5%) and the current official interest rate referred by the Central Bank of Jordan (2.5%)

³⁵ Kelpasaite (2016), Albert et al (2013) and Hunter et al (2019)

Table 33. Wastewater Treatment Plants

WWTP	Design capacity (m ³ /d)	Type of treatment	Effluent [m ³ /day]	Storage (m ³)	Assumption	Construction Costs (JOD)	O&M per year (JOD)
Al Tafila	7,500.00	Trickling filters	3083.62	90,000	30 days of effluent go unutilized in the winter and can be stored	\$520,035	\$159,688
Al Karak	1,600.00	Trickling filters	780.525	25000	30 days of effluent go unutilized in the winter and can be stored	\$391,950	\$27,375
Madaba	7,600.00	Activated sludge	2189	30000	Size determined by land available on site	\$369,362	\$36,500

Additional value of production is estimated under the basis of the aggregation of additional farms expected to take profit of new access to reclaimed water for irrigation. One farming model was developed under the basis of a Madaba WWT Plant field visits were farmers having access to reclaimed water changed the cropping pattern from rainfed Barley to irrigated Alfalfa (Model 9.1).

Given the potential number of farmers to be reached with the current investments and the amount of water stored, the following profitability results were obtained per WWT Plant (and then aggregated).

Table 34. Profitability results per WWT Plant

Tafilah WWTP		Madaba WWTP		Karak WWTP	
<i>Discount rate</i>	4%	<i>Discount rate</i>	4%	<i>Discount rate</i>	4%
<i>NVP @4%</i>	\$91,166	<i>NVP @4%</i>	\$1,408,560	<i>NVP @4%</i>	\$725,541
<i>EIRR</i>	6.1%	<i>EIRR</i>	20.5%	<i>EIRR</i>	14.6%
<i>Ratio B/C</i>	1.09	<i>Ratio B/C</i>	1.43	<i>Ratio B/C</i>	1.85

Summary. Under Component 1: Climate Resilient Water Systems, the following quantitative benefits can be pointed out:

Output 1: a) 7850 private households saving USD 127 per year (30 m³ saved per HH) after implementing water saving devices and gadgets for home-consumption; b) 7,850 private households saving between USD 93 and USD 200 on purchasing water tankers in the absence of harvested rainwater (between 22 m³ and 47m³ saved per HH), depending on the rooftop area, tank size and rainfall levels; and c) 400 Public buildings saving between USD 363 and USD 585 of expenditure on purchased water in the absence of the harvested rainwater (between 87 m³ and 137 m³ saved).

Output 2: a) 176 farmers generating around USD 620 per year of incremental income after benefiting from additional reclaimed water for agricultural production; and b) USD 210,000 saved per year due to the avoided cost of tertiary treatment of additional water storage in 3 Water Treatment Plants

Table 35. Profitability indicators for Component 1 interventions

Model		EIRR	NPV (USD)	B/C Ratio
C1.1.1	Madaba			
	HH Rooftops 100m2 (60%)	28.6%	4,542	4.3
	HH Rooftops 200m2 (40%)	18.3%	4,631	3.0
	Public Buildings	11.4%	5,212	2.0
	Karak			
	HH Rooftops 100m2 (60%)	63.9%	14,668	4.4
	HH Rooftops 200m2 (40%)	36.4%	7,558	3.1
	Public Buildings	6.8%	2,912	1.4
	Tafilah			
	HH Rooftops 100m2 (60%)	34.2%	3,905	5.1
	HH Rooftops 200m2 (40%)	19.4%	4,156	3.2
	Public Buildings	6.8%	2,168	1.4
	Ma'an			
	HH Rooftops 100m2 (60%)	78.5%	3,625	8.5
	HH Rooftops 200m2 (40%)	34.0%	3,776	4.9
	Public Buildings	15.5%	4,207	2.6
Model		EIRR	NPV (JOD)	B/C Ratio
C1.1.2	Tafilah WWTP	6.3%	100,907	1.1
	Karak WWTP	15.0%	761,947	1.9
	Madaba WWTP	20.8%	1,449,507	1.4

Aggregation / Calendar. Benefits mentioned were considered together with the Component 2 aggregated models. The following table presents the expected beneficiaries per activity in Component 2

Table 36. Calendar of beneficiaries' incorporation

# Model	Models	Unit	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Total	Adoption
1	Rainfed Barley	#HH	0	98	195	195	293	195	0	0	975	70%
		Agg.	0	98	293	488	780	975	975	975		
		Ha	0	390	780	780	1170	780	0	0		
2	Rainfed Wheat	#HH	0	98	195	195	293	195	0	0	975	70%
		Agg.	0	98	293	488	780	975	975	975		
		Ha	0	281	563	563	844	563	0	0		
3.1	Olive trees irrigated	#HH	38	105	105	105	105	57	0	0	517	60%
		Agg.	38	144	249	354	459	517	517	517		
		Ha	77	210	210	210	210	115	0	0		
3.2	Olive trees non-I	#HH	52	144	144	144	144	78	0	0	706	60%
		Agg.	52	196	340	483	627	706	706	706		
		Ha	105	287	287	287	287	157	0	0		
4	Grapes irrigated	#HH	3	8	8	8	8	4	0	0	38	60%
		Agg.	3	11	18	26	34	38	38	38		
		Ha	6	15	15	15	15	8	0	0		
5	Tomatoes	#HH	62	171	171	171	171	93	0	0	840	50%
		Agg.	62	233	404	576	747	840	840	840		
		Ha	62	171	171	171	171	93	0	0		
6	Wicking beds	#HH	39	107	107	107	107	58	0	0	525	50%
		Agg.	39	146	253	360	467	525	525	525		
7.1	Grownbag GH Tomatoes conv	#HH	32	87	87	87	87	48	0	0	428	60%
		Agg.	32	119	206	293	380	428	428	428		
		Ha	1	2	2	2	2	1	0	0		
7.2	Grownbag GH Tomatoes new	#HH	21	58	58	58	58	32	0	0	285	60%
		Agg.	21	79	137	195	253	285	285	285		
		Ha	1	2	2	2	2	1	0	0		
8.1	Grownbag GH Cucumber conv	#HH	32	87	87	87	87	48	0	0	428	60%
		Agg.	32	119	206	293	380	428	428	428		

		Ha	1	2	2	2	2	1	0	0	12	
8.2	Grownbag GH Cucumber new	#HH	21	58	58	58	58	32	0	0	285	
		Agg.	21	79	137	195	253	285	285	285		
		Ha	1	2	2	2	2	1	0	0	8	
											10,111	
GH Size (ha)		0.027									6000	

Component	Activity	Hectares
Component 1	WWTP beneficiaries	528
Component 2	See Calendar	10,111
Total		10,639

Economic prices. In the economic analysis conversion factors were applied to obtain economic prices. Selected conversion factors were calculated for family labor costs (based on official unemployment rates³⁶ for rural areas and youth), tradable goods as exported outputs³⁷ (Tomato), imported outputs³⁸ (Barley) and Urea (imported inputs³⁹), based on World Bank's Commodity Outlook for international prices, discounting subsidies, taxes and tariffs and the cost of Water (discounting subsidies). No conversion factors were applied to non-tradable goods and project costs as costing was made without considering taxes and duties. Detailed calculations can be found in Annex 3 EFA Spreadsheet.

A sensitivity scenario is being included for the economic price of water, describing the systems where water harvesting systems profitability would be at risks.

Economic profitability indicators. An analysis of the Value for Money Metrics of the Project shows that the project investment is highly justified based on both financial and economic analysis. The project investments have an Economic Rate of Return of 24.1% after applying a standard conversion factor to obtain economic prices, incorporating economic models for benefits of water saving interventions and aggregating economic incremental benefits to be compared with total project costs (excluding investment costs already considered in the models in order to avoid double-counting. Recurrent costs of operation and maintenance were included after year 7 to represent the minimum required investment needed to ensure the sustainability of benefits. The Net Present Value was estimated to be US\$ 80.16 million with a benefit- cost ratio of 2.95, and a social discount rate estimated at 4% over the period of 30 years for the economic analysis. The economic discount rate is based on the average rate of a 10yr Bond yield in Jordan (at 5.5%) and the Central Bank of Jordan's official reference interest rate (at 2.5%)⁴⁰.

Other aggregated quantitative benefits.

Avoided losses due to climate change are estimated at USD 333.000 after year 10 due to the promotion of local seed varieties and adaptive technologies to reduce climate change impact on wheat and barley yields in the project area (affected by increased temperatures and decreased precipitations) (Wheat: 177 tons/year in total and Barley: 727 tons/year). This could go beyond this number considering that the Project will impact people directly in the project area and indirectly through its engagement at the national level through dissemination of information through smart applications and its work with policy and regulatory reform. In addition to this, the project is expected to achieve 3% to 3.5% reduction in groundwater overdraft and to contribute up to 4.5% to the water management goals in the National Water Strategy. Cumulative water savings are estimated at around 1.83 MCM in a 10yr period and 5.49 MCM for the project's lifespan (30

³⁶ Department of Statistics, Yearbook 2018

³⁷ CF: 1.33

³⁸ CF: 0.5

³⁹ CF: 0.88

⁴⁰ As of April 2020: [www. http://www.cbj.gov.jo/](http://www.cbj.gov.jo/).

years). Detailed calculations are being presented in Annex 3 (EFA Spreadsheet) based on the expected amount of water saved per governorate due to Component 1 interventions. Finally, 10,600 hectares of agricultural land area will be made more resilient with climate-adaptive measures in the project area.

Qualitative Benefits. The increased availability of water from roof-top harvesting structures is expected to also generate co-benefits in terms of improved health and sanitation. The lack of water and secondary effects of these changes are considered as one of the highest threats to health in Jordan. In 2005, a WHO/UNEP project determining minimum water requirements for health in Jordan showed a linkage between the per capita water consumption and the incidence of diarrhea. The importance of washing hands to avoid the menace of coronavirus is a testament to the health impacts of increased water supply. The increased water availability from RWH is likely to generate improved health status of households, enhance hygiene – with subsequent reduction in the risk of disease transmission, reduce their health costs and reduce the pressure on Government health facilities. Other co-benefits will be generated in terms of increased business opportunities for entrepreneurs trained in installing RWH and the increased employment opportunities for the youth for employment in these enterprises. improved access to water harvested from the rooftop and reclaimed water: (i) economic impact of improved nutrition, health and food security; (ii) water subsidies public bill reduced; (iii) avoided downstream contamination from discharge of reclaimed water which has not undergone tertiary treatment, (iv) the economic benefits of additional employments generated through the backward and forward multiplier effects in the project area.

3.5 Sensitivity Analysis and Risk assessment

A sensitivity test was developed using different risk-occurrence scenarios. These included increase in project costs (10% and 20%), a reduction in project benefits (10% and 20%), and combined scenarios (of both benefits reduced by 10%, 20% and 30% and costs increased by 10% or 20%). Additionally, a delay in project benefits (1 and 2 years) and the reduction in benefits by 50% every 2 and 3 years due to the occurrence of climate change shocks were considered. NPV remains positive so the project is still considered to be profitable under the tested scenarios. Detailed assumptions and calculations are attached in Annex 3. Table 38 below presents the main results of the sensitivity test. The analysis shows that the project is most sensitive to reduction in benefits.

Table 37. Sensitivity Analysis

Sensitivity Analysis							
	Δ%	Risk			EIRR	NPV (US\$)	
Base scenario					24.10%	80,158,697	
Benefits	-10%	Combined risks on sale prices, yields, adoption rates			21.70%	68,026,928	
	-20%				19.18%	55,895,159	
Costs	10%	Increase in expenses, input prices and unit costs			21.92%	76,042,797	
	20%				20.03%	71,926,898	
Delay 1yr in Benefits		Adoption rate / delays			20.02%	74,855,244	
Delay 2yr in Benefits					17.23%	69,755,771	
External Shock every 2 yr	50% Benefits	External shock (prices, quantities, climate)			20.56%	40,879,216	
External Shock every 3 yr	50% Benefits				21.75%	66,196,887	
Mixed Scenarios		Costs	10%	Benefits	-10%	19.64%	63,911,028
			10%		-20%	17.24%	51,779,259
			20%		-20%	15.55%	47,663,360
			20%		-30%	8.77%	15,383,952
			20%		-10%	17.86%	59,795,129

Additional sensitivity scenarios. The economic price of water at 3 JOD/m³ is considered based on the economic price selected by Abdulla (2019) for calculating economic benefits, taking into consideration the price of water from tankers during the dry season, without distortions and public subsidies. While a lower economic price of water would have negative implications for the water harvesting systems stream of benefits (negatively affecting a few models for selected size of tanks and governorates), it would have a slightly positive side for Component 2 models where lower economic costs of water would lead to lower costs and increased margins. The following table present the sensitivity test of changes in the economic price of water.

Table 38. Additional Sensitivity Scenarios with different economic prices of water

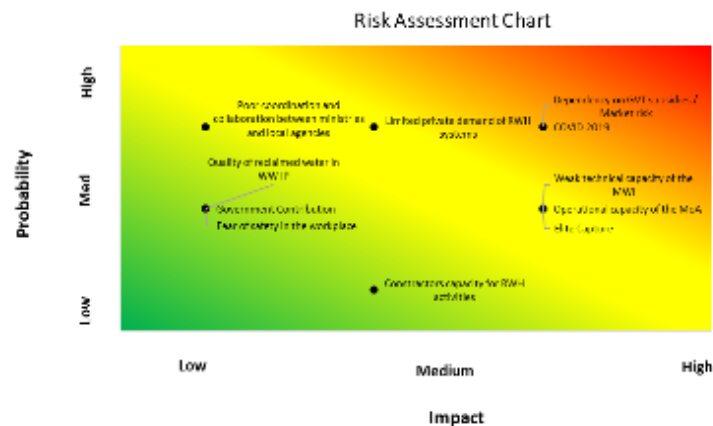
Economic Price of water	0.5 JOD/m3	1 JOD/m3	2 JOD/m3	3 JOD/m3 (Base case)
Overall EIRR	20.28%	21.05%	22.58%	24.1%
Overall NPV	USD 60.6 million	USD 64.5 million	USD 73.3 million	USD 80.16 million

Risk assessment chart. The following risk assessment chart was prepared to link the identified risks (with hypothetical scoring for probability and impact) and the EFA impacts (given the possible cost and benefit scenarios.).

Table 39. Link between risks factors and the EFA Analysis

#	Risk Factor	Impact	Probability	Risk Type	Impact type	Impact on the EFA	
						EIRR (%)	NPV (USD M)
			BASE				
RF1	Government Contribution	3	2	Governance	Reduction in Benefits 20%	24.10%	80,158,697
RF2	Weak technical capacity of the MWI	3	2	Technical and operational	Delay in benefits 2 years	19.18%	55,895,159
RF3	Operational capacity of the MoA	3	2	Technical and operational	Combined Benefits -20% / Costs +10%	17.24%	51,779,259
RF4	Contractors capacity for RWH activities	2	3	Technical and operational	Reduction in Benefits 20%	14.16%	55,295,159
RF5	Quality of reclaimed water in WWTP	3	2	Technical and operational	Reduction in Benefits 10%	21.70%	68,026,928
RF6	Elite Capture	3	2	Governance	Combined Benefits -10% / Costs +10%	19.64%	63,911,028
RF7	Fear of safety in the workplace	3	2	Other	Reduction in Benefits 10%	21.70%	68,026,928
RF8	Limited private demand of RWH systems	2	3	Technical and operational	Reduction in Benefits 20%	19.18%	55,895,159
RF9	Poor coordination and collaboration between	1	3	Governance	Delays in benefits 1 year	20.02%	74,855,244
RF10	Dependency on GVT subsidies / Market risk	3	3	Other	Reduction in Benefits 50%	10.38%	15,199,852
RF11	COVID 2019	3	3	Technical and operational	Delay in benefits 3 years	15.15%	64,852,431

Figure 11- Risk assessment chart



This type of Assessment situates COVID-2019 and Market risks in the upper-side (high probability and high impact) whereas Government Contribution or the quality of reclaimed water in WWTP are situated in the low/medium range side for example.

3.6 Benchmarks

The following table compares BRCCJ Project's cost-effectiveness indicators with other GCF funded rural development projects in the region. GCF Cost per beneficiary is estimated at 117.7 US\$ and it is aligned with cost-effectiveness indicators of rural adaptation projects in the region.

Table 40. Project Cost Effectiveness Comparisons

Projects	BRCCJ	CFAVCP	WBAACC	BRCRN	BRCRN	ECCANCN
	Jordan	Cambodia	Palestine	Nepal	Pakistan	Egypt
Date of approval		March 2018	December 2019	December 2019	July 2019	March 2018
Direct Beneficiaries	212,416	390,000	223,553	200,681	1.3 million	768,164
EIRR	24.1%	16.13%	-	20%	18.8%	20.2%
NPV	US\$ 80.16 Million	US\$ 133,543	-	US\$ 40.9 million	US\$ 15.78 million	US\$ 124.76 million
Effectiveness of GCF Adaptation Investment (USD GCF/Beneficiary)	USD 117.7/beneficiary	USD 102/beneficiary	EUR 106/beneficiary	USD 195/beneficiary	USD 27/beneficiary	USD 41/beneficiary
Effectiveness of total Investment (USD/Beneficiary)	156.5 USD/beneficiary	362 USD/beneficiary	200 EUR/beneficiary	236 USD/beneficiary	37 USD/beneficiary	137 USD/beneficiary
Total Cost	33.25	141.39	44.7 (MM Eur)	47.3	47.7	105.2
(USD millions)						
GCF funding (USD Million)	25 Million grant	10 Million loan	23.7 Million grant (MM Eur)	39.3 Million grant	35 Million grant	31 38 Million grant

4. Financial needs of the recipient

4.1 Macroeconomic overview

The Hashemite Kingdom of Jordan is currently classified as an upper middle-income country⁴¹. However, GDP growth averaged 6.4% during 2000–09 and fell below 2.5 % over 2010–18⁴². In 2018, GDP growth was 1.9% and a modest 1.8 % is estimated for 2019⁴³. The unemployment rate raised up from 18.7% to 19.2% between 2018 and 2019 and fiscal deficit accounts is estimated at 2.8% of the GDP showing an increase from 2017 estimates (2.3%).

The weak performance of growth is a consequence of the sluggish domestic and external demand and the fiscal consolidation efforts which had impacts on unemployment rates. The exchange rate is pegged to the US dollar at 0.71 JOD/USD and inflation is expected to be kept under control (between 0.3 and 1.1 percent) given the fall in import commodity prices in 2019. This could change in the future if there is an increase in import commodity prices. The country has a very high public/debt ratio estimated at 94.4% in 2019. Dependence on food and energy imports explains the country's large structural trade deficit. In 2019, current-account deficit is estimated 3% of GDP.

The country's classification as a MIC does not consider the burden the country is facing of hosting refugees. The population of Jordan was estimated to be 10.2 million in March 2020⁴⁴ including 1.3 million Syrian refugees⁴⁵ and refugees from a host of other countries as well⁴⁶. In addition, the country's economy and society have faced significant shocks in the past few years. The regional conflicts in Syria and Iraq, the country's main trading partners, seriously damaged Jordan's trade routes and capital inflows. The influx of refugees continues to exert tremendous pressure on, not only its infrastructure and social services, but also on its labour market and social cohesion. As a result, the country's macroeconomic indicators weakened, the fiscal deficit rose, and financing the external sector became challenging.

Jordan was among the first countries in the region to adopt an immediate response to contain the spread of the COVID-19 in February 2019. In addition to sealing off its borders and suspending all flights, giving all public sector employees two weeks of leave and suspending schools and universities, Jordan has imposed a complete nationwide lockdown since March 20, 2020. Since the lockdown duration is unpredictable during the current design, it is difficult to speculate how much the economy will suffer. IMF support to pursue economic reforms (supported by a US\$1.3bn IMF programme) was shifted to

⁴¹ World Bank June 2019. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>

⁴² Economic Intelligence Unit- Country Report: Jordan, December 2019.

⁴³ World Bank estimates.

⁴⁴ <https://www.worldometers.info/world-population/jordan-population/>

⁴⁵ Jordan Economic Growth Plan 2018 - 2022 The Economic Policy Council. The Economic Policy Council.

⁴⁶ UNHCR Fact Sheet. May 2019. <https://reliefweb.int/sites/reliefweb.int/files/resources/69826.pdf>

mitigate the impact of the coronavirus, which will affect consumption and investment. As a consequence, negative GDP growth and a significant widening of the budget deficit in 2020 (EIU; 2020).

In March, the International Monetary Fund (IMF) predicted that the kingdom's gross domestic product will grow by 2.1% in 2020. Following the lockdown and amid the global coronavirus outbreak, that figure is no longer realistic. The Central Bank has taken a series of measures to provide relief to the economy. The central bank also called on banks to reschedule loans and offer appropriate grace periods with no additional charge to their clients. The pandemic is likely to worsen the economic pressures on the country⁴⁷.

Regardless of the efforts made in reforming its economy, challenges increased as a consequence of the impact of the ongoing COVID-19 outbreak, regional conflicts, and the hosting of Syrian refugees weigh on social conditions, public finances, investment, and the external accounts (as it was mentioned in the last IMF press report).

Table 41. Key Macroeconomic indicators I

	Indicator	Period	Source of information
% GDP growth	1.8%	2019	IMF March 2020
Exchange rate JOD/US\$	0.71	2019	IMF March 2020
Unemployment rate	19.2%	2019	EIU December 2019
Inflation rate	0.5%	2019	EIU December 2019
Public debt/GDP ratio	94.4%	2019	Finance Ministry Bulletin 2019
Current-account deficit/GDP	3%	2019	EIU December 2020
Lending interest rates	8.7%	2019	EIU December 2019
Agriculture/GDP	3%	2019	EIU December 2019

Table 42. Key Macroeconomic indicators II (EIU; 2019)

Annual data	2019
Population (m)	10.6
GDP (US\$ bn; market exchange rate)	43.8
GDP (US\$ bn; purchasing power parity)	98
GDP per head (US\$; market exchange rate)	4,145
GDP per head (US\$; purchasing power parity)	9,280
Historical averages (%)	2015-19
Population growth	3.7
Real GDP growth	2.1
Real domestic demand growth	1.8
Inflation	1.4
Current-account balance (% of GDP)	-7.9
FDI inflows (% of GDP)	3.5

Table 43. Key Macroeconomic indicators III (EIU; 2019)

Major exports 2018	% of total	Major imports 2018	% of total
Manufactured goods	32.4	Machinery & transport equipment	26.1

⁴⁷ <https://www.al-monitor.com/pulse/originals/2020/03/jordan-lockdown-economy-measures-coronavirus.html#ixzz6HrNu9CP8>

Chemicals	21.1	Food & live animals	16.4
Food & live animals	11.8	Manufactured goods	15.5
Crude materials	13.5	Crude oil & petroleum products	13.4

Despite its small contribution to national GDP, the agriculture sector is of critical importance in Jordan, for its socio-economic fabric, and role in political stability, as well as its central role in food security, rural development, providing job opportunities, and the forward and backward linkages it creates. The country has limited land resources and only around 5 percent of its land area is arable. Much of Government of Jordan's (GOJ's) domestic agricultural policy is focused on the management of its scarce and rapidly depleting water resources in an effort to support its traditional livestock owners and develop an export-oriented horticultural sector⁴⁸. Jordan currently imports the vast majority of its basic food crops, including almost all of its cereals. The Jordan Economic Growth Plan has set a target of 5% growth in GDP and the expectation is that agriculture will have to grow by 10% to meet this target. The request for financing to GCF is premised on the GoK's understanding that it needs to prioritize a series of measures and investments to deal with its vulnerability to climate change which further exacerbates its problems of water scarcity and rural growth and development. In recent years, the impact of flash floods on the all-important tourism sector that was evident in 2018 has also taken a toll on projected growth.

4.2 Justification of the concessionally levels required

Macroeconomic perspectives in the country due to the COVID-19 outbreak and the current fiscal situation, urge the need for the international community to support Jordan to maintain development and climate adaptation investments and responses to the current situation.

As the IMF states in the last country press release (26-March) the country needs “*continued support from donors, particularly through concessional loans and budget grants, will be critical to help Jordan cope with humanitarian and economic needs*”⁴⁹. The lack of funding in Jordan public finance can be explained by the budgetary burden of hosting more than a million Syrian refugees besides of helping to ensure the security measures needed in the region.

Concerning climate change financing, while a climate change national adaptation plan (NAP) clearly establishes objectives, key investment areas and a pathway, the implementation is being jeopardized by the absence of public and private sources of financing. From the public perspective, the current context shows high fiscal imbalances and very high public debt (IMF Press Release n°19/435- November 2019). There was a recent cut on public investment as “efforts to broaden the tax base and mobilize revenues to support Jordan's fiscal and development needs have fallen short of expectations”. As a consequence, the Government is short of finances for making the required investments even if most of the proposed investments in ecosystem services at the landscape level are public goods in nature and need government support.

The grant element is justified by the growing concerns about Jordan's public debt which increased to JD 29.51 billion at the end of July 2019 constituting 94.4 per cent of the estimated gross domestic product (GDP)⁵⁰. The local component of public debt is marginally higher than foreign debt. Interest payments on local debt is more costly than foreign debt⁵¹. The country does not want to add to its growing debt burden and simply does not have the resources to invest in critical investment areas and has been forced to impose a blanket reduction on the approved budgets of public sector institutions.

⁴⁸USDA Foreign Agricultural Service, 2015. Market Overview and Guide to Jordanian Market Requirements.

⁴⁹ IMF (2020). Press release n°20/107, <https://www.imf.org/en/News/Articles/2020/03/25/pr20107-jordan-imf-executive-board-approves-us-1-3-bn-extended-arrangement-under-the-eff>

⁵⁰ Finance Ministry's monthly bulletin. July 2019. Government of Jordan.

⁵¹ Jordan Strategy Forum. Public Borrowing in Jordan. February 2018. <http://jsf.org/sites/default/files/EN-Crowding-Out%20Effect%20Policy%20Paper.pdf>

5. Annexes

5.1 Annex 1. Detailed cost tables

Table 44. Component 1.

COMPONENTS, SUB-COMPONENTS, OUTPUTS AND ACTIVITIES	UNIT	Years							Final target	Unit cost (USD/unit)	Total Cost (USD)	Funding Sources				Share of funding sources (%)			
		1	2	3	4	5	6	7				Green Climate Fund (Grant)	Government	FAO	UNDP	Green Climate Fund (Grant)	Government	FAO	UNDP
COMPONENT 1: Climate resilient water systems											19,800,607	14,868,306	3,947,301	-	985,000				
Outcome 1.1 Enhanced water availability to address climate change risks											19,800,607	14,868,306	3,947,301	-	985,000				
Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures											14,351,707	11,553,406	2,313,301	-	485,000				
Activity 1.1.1.1 Provide Technical assistance and oversight for water resilient systems									0	-	-	-	-	-	-				
Water Engineer Specialist	month	12	12	12	12	12	12	12	84	3,500	294,000	294,000	-	-	-	100%			
Allowances Water engineer Specialist	pers.day		120	120	120	120	120	120	720	261	187,920	187,920	-	-	-	100%			
M&E officer	month	12	12	12	12	12	12	12	84	2,000	168,000	168,000	-	-	-	100%			
M&E Specialist	month	12	12	12	12	12	12	12	84	3,000	252,000	252,000	-	-	-	100%			
Technical Advisor- Focal Point from MoE	month	12	12	12	12	12	12	12	84	3,000	252,000	252,000	-	-	-	100%			
Allowances M&E Officer and Spedalist	days	60	60	60	60	60	60	60	420	90	37,800	37,800	-	-	-	100%			
Mid-term and final surveye	lumpsum				1				2	40,000	80,000	80,000	-	-	-	100%			
Knowledge management products and studies	units						1	1	2	20,000	40,000	40,000	-	-	-	100%			
Vehicle	unit	1							1	45,000	45,000	45,000	-	-	-	100%			
Vehicle O&M	ls/unit	1	1	1	1	1	1	1	7	3,860	27,020	27,020	-	-	-	100%			
Monitoring equipment	Set	2				1			3	3,800	11,400	11,400	-	-	-	100%			
IT / Software equipment and trainings	lumpsum	1	1	1	1	1	1	1	7	6,111	42,780	42,780	-	-	-	100%			
Communication campaigns, traslations and multimedia	lumpsum	1	0.2	0.2	0.5	0.2	0.2	0.2	2.5	15,000	37,500	37,500	-	-	-	100%			
Office utilities O&M	lumpsum	0.25	0.25	0.25	0.25	0.25	0.25		1.5	13,000	19,500	19,500	-	-	-	100%			
Contingencies	lumpsum	1				1			2	74,506	149,011	149,011	-	-	-	100%			
Activity 1.1.1.2 Selection of public buildings and awareness on water conservation schools and municipal officials									1	231,801	231,801	231,801	-	-	-	100%			
Contracting a service provider for the awareness campaign in schools, selection of public buildings and trainings	0.2	0.2	0.2	0.2	0.2	0.2			1	231,801	231,801	231,801	-	-	-	100%			
Activity 1.1.1.3 Construction of Rooftop rainwater harvesting system in public buildings											-	-	-	-	-	100%			
Construct Rooftop rainwater harvesting systems in public buildings	Buildings	0	80	120	160	40	0	0	400	3,867	1,546,890	1,546,890	-	-	-	100%			
Water saving equipments and devices	Kit		80	120	160	40	0	0	400	100	40,000	-	40,000	-	-	100%			
Staff time (MWI)	month		24	24	24	24			96	900	86,400	-	86,400	-	-	100%			
Activity 1.1.1.4 Select beneficiaries, provide orientation on water conservation to households									20	90,000	1,800,000	1,800,000	-	-	-	100%			
Contracting a service provider for identification, sensitization and training	lumpsum		4	4	4	4	4	4	20	90,000	1,800,000	1,800,000	-	-	-	100%			
UNDP site manager and operational support		1	1	1	1	1	1	1	7	69,286	485,000	-	-	485,000	-	-	100%		
Activity 1.1.1.5 Construction of Rooftop rainwater harvesting system in households											-	-	-	-	-	100%			
Construct Rooftop rainwater harvesting systems in households	Households	0	293	878	1463	1755	0	5850	1,039	6,080,785	6,080,785	-	-	-	-	100%			
Government Scaling-up Construction of Rooftop rainwater harvesting systems in households	Households	0	0	200	400	600	800	0	2000	1,039	2,078,901	-	2,078,901	-	-	100%			
Staff time (MWI)	month		24	24	24	24	24		120	900	108,000	-	108,000	-	-	100%			
Activity 1.1.1.6 Independent Impact assessment for C1									1	1	250,000	250,000	-	-	-	100%			
Contracting a service provider to conduct the independent impact assessment	lumpsum				-				1	1	250,000	250,000	-	-	-	100%			
Output 1.1.2 By year 7, reuse of reclaimed water from 3 Waste Water Plants is optimized											3,585,700	2,151,700	1,434,000	-	-				
Activity 1.1.2.1 Build storage and distribution infrastructure to maximize reuse of reclaimed water from existing WWT plants											-	-	-	-	-	100%			
Storage and distribution capacity maximized Madaba WWTP	Plant			1					1	733,250	733,250	733,250	-	-	-	100%			
Storage and distribution capacity maximized Karak WWTP	Plant				1				1	552,650	552,650	552,650	-	-	-	100%			
Storage and distribution capacity maximized Tafleeh WWTP	Plant					1			1	520,800	520,800	520,800	-	-	-	100%			
Operation and Maintenance cost by the MWI	lumpsum			0.16	0.18		0.22	0.22	0.2197	1	1,434,000	1,434,000	-	1,434,000	-	-	100%		
Activity 1.1.2.2 Technical assistance to MWI and Ministry of Health to assure compliance with environmental standards											-	-	-	-	-	100%			
Contracting a service provider to test water and soil quality to assure environmental compliance	lumpsum			0.50	1.00	1.50			3	15,000	45,000	45,000	-	-	-	100%			
Activity 1.1.2.3 Technical assistance to promote demand and safe reuse of reclaimed water, including building local capacity of farmers and Water User Associations									0		-	-	-	-	-	100%			
Contracting a service provider to build local capacity of farmers and WUA	Lumpsum		1	1	1				3	100,000	300,000	300,000	0	-	0	100%			
Output 1.1.3 By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin											1,863,200	1,163,200	200,000	-	500,000				
Activity 1.1.3.1 Establish plan objectives and criteria									0		-	-	-	-	-	100%			
Contract with service provider	lumpsum	1							1	100,000	100,000	100,000	-	-	-	100%			
Staff time (MWI)	lumpsum	0.5	0.5						1	100,000	100,000	-	100,000	-	-	100%			
Water Specialist to advice and provide oversight	days	60	60	60	60				240	500	120,000	120,000	-	-	-	100%			
Travel and allowances Water specialist	trip	1	1	1	1				4	10,800	43,200	43,200	-	-	-	100%			
UNDP support to the landscape resilience investment plan	lumpsum	0.2	0.4	0.4					1	500,000	500,000	-	-	-	500,000	-	-	100%	
Activity 1.1.3.2 Execute technical, economic, environmental and social feasibility studies											-	-	-	-	-	100%			
Contract with service provider to prepare the feasibility studies	lumpsum		0.33	0.33	0.33				1	800,000	800,000	800,000	-	-	-	100%			
Staff time (MWI)	lumpsum		0.25	0.25	0.25	0.25			1	100,000	100,000	-	100,000	-	-	100%			
Activity 1.1.3.3 Disseminate and validate investment Plan									0		-	-	-	-	-	100%			
Contract with service provider to validate list of investments	lumpsum				1				1	100,000	100,000	100,000	-	-	-	100%			

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Table 45. Component 2.

COMPONENTS, SUB-COMPONENTS, OUTPUTS AND ACTIVITIES	UNIT	Years							Final target	Unit cost (USD/unit)	Total Cost (USD)	Funding Sources				Share of funding sources (%)			
		1	2	3	4	5	6	7				Green Climate Fund (Grant)	Government	FAO	UNDP	Green Climate Fund (Grant)	Government	FAO	UNDP
COMPONENT 2: Climate Change resilience for Enhanced Livelihoods and Food Security											8,019,627	5,679,427	1,864,200	575,000	-				
Outcome 2.1 Enhanced capacity of households to deal with climate change											8,019,627	5,679,427	1,864,200	575,000	-				
Output 2.1.1 By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (1950)									0		5,466,027	3,900,427	1,290,600	275,000	-				
Activity 2.1.1.1 Provide Technical assistance and oversight for climate change adaptation																			
Agronomist and Climate change adaptation Specialist	month	12	12	12	12	12	12	12	84	3,500	294,000	294,000	-	-	-	100%			
Allowances Agronomist and Climate change adaptation Specialist	pers.day		180	180	180	180	180	180	1080	261	281,880	281,880	-	-	-	100%			
Social inclusion and gender Specialist	lumpsum	1	1	1	1	1	1	1	7	25,000	175,000	-	-	175,000	-			100%	
M&E officer	month	12	12	12	12	12	12	12	84	2,000	168,000	168,000	-	-	-	100%			
Allowances M&E Officer	days	60	60	60	60	60	60	60	420	70	29,400	29,400	-	-	-	100%			
Mid-term and final surveys	lumpsum				1			1	2	40,000	80,000	80,000	-	-	-	100%			
Knowledge management products and studies	unit					1	1		2	20,000	40,000	40,000	-	-	-	100%			
Vehicle	unit	1							1	45,000	45,000	45,000	-	-	-	100%			
Vehicle O&M	ls/unit	1	1	1	1		1	1	7	3,860	27,020	27,020	-	-	-	100%			
Monitoring equipment	Set	1							2	3,600	7,600	7,600	-	-	-	100%			
Communication campaigns, traslations and multimedia	lumpsum	1	0.2	0.2	0.5	0.2	0.2	0.2	2.5	15,000	37,500	37,500	-	-	-	100%			
Office utilities O&M	lumpsum	0.25	0.25	0.25	0.25	0.25	0.25		1.5	13,000	19,500	19,500	-	-	-	100%			
Contingencies	lumpsum	1			1				2	138,064	276,127	276,127	-	-	-	100%			
Activity 2.1.1.2 Design appropriate modules for Climate Smart FFS																			
Local Consultant expert on FFS	pers.day	120			60				180	250	45,000	45,000	-	-	-	100%			
International Consultant expert on FFS and Climate change	pers.day	120			2				180	500	90,000	90,000	-	-	-	100%			
Travel International Consultant	Trip	4			2				6	10,800	64,800	64,800	-	-	-	100%			
Travel Local Consultant	Trip	4			2				6	7,100	42,600	42,600	-	-	-	100%			
Translations/Developing communication material	lumpsum	1			0.5				1.5	15,000	22,500	22,500	-	-	-	100%			
Activity 2.1.1.3 Training a team of Master Trainers/Facilitators																			
Local Consultant trainer of trainers	pers.day	90			40				180	250	45,000	45,000	-	-	-	100%			
International Consultant trainer of trainers	pers.day	90			90				180	500	90,000	90,000	-	-	-	100%			
Trainings of trainers	Sessions	30			30				60	2,200	132,000	132,000	-	-	-	100%			
International Consultant travel	Trip	1			1				2	29,100	58,200	58,200	-	-	-	100%			
National consultant travel	Trip	1			1				2	11,400	22,800	22,800	-	-	-	100%			
FAO support to the training of FFS master trainer										100,000	100,000	-	-	100,000	-			100%	
Activity 2.1.1.4 Identify target groups in Project Area																			
Local consultant to develop the targeting criteria and identify groups in Project Area	days	200	550	550	550	550	300		270	30	81,000	-	81,000	-	0		100%		
Allowances local consultant	Group	20	55	55	55	55	30		270	100	27,000	27,000	-	-	-	100%			
Activity 2.1.1.5 Scaling-up FAO collect mobile geo-referenced monitoring application of adoption rates																			
International Consultant to develop the monitoring system and App	days	120	10	10	10	10	30		190	500	95,000	95,000	-	-	-	100%			
Travel International Consultant	Trip	1					1		2	10,800	21,600	21,600	-	-	-	100%			
Trainings of M&E experts, Extensionists and Farmers groups on the use of the App	Sessions	6					6		12	2,400	26,400	26,400	-	-	-	100%			
Equipping the extension staff with smart devices and software	Units	60			60				120	300	36,000	36,000	-	-	-	100%			
Communication, traslations and multimedia	lumpsum	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.7	15,000	10,500	10,500	-	-	-	100%			
Activity 2.1.1.6 Conduct Climate Smart FFS																			
Extensionists mobilized	Group	20	55	55	55	55	30	0	270	4,480	1,209,600	-	1209600	-	0		100%		
FFS kit	Production pa	20	55	55	55	55	30	0	270	2,000	540,000	540,000	0	-	0	100%			
FFS sessions	FFS	20	55	55	55	55	30	0	270	2,500	675,000	675,000	0	-	0	100%			
Activity 2.1.1.7 Field demonstration of tested climate-adaptive innovation and practices																			
Field day visits	Sessions		50	100	100	150	100		500	600	300,000	300,000	0	-	0	100%			
Activity 2.1.1.8 Independent Impact assessment for C2																			
Contracting a service provider to conduct the independent impact assessment	lumpsum				0				1	250,000	250,000	250,000	0	-	0	100%			
Output 2.1.2 By year 7, 30,000 Farmers reached through e-extension											623,600	50,000	573,600	200,000	-				
Activity 2.1.2.1 Developing climate-smart IT solutions for smart devices																			
Developing the e-system and application	lumpsum	0.1							1	50,000	50,000	50,000	-	0	-	100%			
Activity 2.1.2.2 Disseminating climate smart-solutions and weather forecast through smart devices																			
FAO support to the innovation hub for smart smart agriculture and water scarcity management and development	lumpsum	0.25	0.25	0.25	0.25				1	200,000	200,000	-	0	200,000	-			100%	
Activity 2.1.2.3 Disseminating climate smart-solutions and weather forecast through smart devices																			
Start time (MoA)	month	48	48	48	48	48	48	48	336	600	302,400	-	302,400	-	0		100%		
Studio	Set	1							1	120,000	120,000	-	120,000	-	0		100%		
System O&M	lumpsum	1	1	1	1	1	1	1	6	25,200	151,200	-	151,200	-	0		100%		
Output 2.1.3 By year 3, 400 Women trained as Change Agents for Climate Adaptation											880,250	880,250	-	100,000	-				
Activity 2.1.3.1 Technical assistance in climate adaptive agriculture																			
National Consultant	days	15							15	250	3,750	3,750	-	-	-	100%			
International Consultant Expert on Gender and Climate adaptive agriculture	days	90							90	500	45,000	45,000	-	-	-	100%			
Allowances Gender and climate adaptation Specialist	Trip	1							1	10,800	10,800	-	-	-	-	100%			
Communication, traslations and multimedia	Lumpsum	0.5							0.5	15,000	7,500	7,500	-	-	-	100%			
Activity 2.1.3.2 Development of training manuals and certification requirements																			
Contract with the University	Lumpsum	0.5	0.5						1	30,000	30,000	30,000	-	-	-	100%			
Activity 2.1.3.3 Scholarship for young trainers																			
20% drop off	20% drop off								10										
Travel allowances for participants	Workshop		6						6	800	4,800	4,800	-	-	-	100%			
Trainers Kit / inputs	Kit		10						10	1,000	10,000	10,000	-	-	-	100%			
Training of trainers	Workshop		6						6	8,400	50,400	50,400	-	-	-	100%			
Activity 2.1.3.4 Competitive selection of candidates for climate wise-women																			
Local service provider communicating and selecting climate wise-agents competitively	Lumpsum	1	1						2	35,000	70,000	70,000	-	-	-	100%			
FAO support to the competitive selection of candidates																			
Activity 2.1.3.5 Trainings developed for climate wise-women																			
Contract for trainings, kit and stipends (Madaba, Tafilah)	Contract			0.3	0.3		0.3	0.1	1	324,000	324,000	324,000	-	-	-	100%			
Contract for trainings, kit and stipends (Karak, Ma'an)	Contract			0.3	0.3		0.3	0.1	1	324,000	324,000	324,000	-	-	-	100%			
FAO Support to climate wise women trained																			
FAO Support to climate wise women trained				0.3	0.3		0.3	0.1	1	50,000	50,000	-	50,000	-	-			100%	
Output 2.1.4 By year 7, 15,000 Persons sensitized for climate adaptive measures											748,750	748,750	-	-	-				
Activity 2.1.4.1 Conducting Community dialogues for gender sensitive climate adaptation measures																			
Contracting a service provider to Conduct Community Dialogue in Madaba	Contract		0.25	0.25	0.25		0.25		1	179,688	179,688	179,688	-	-	-	100%			
Contracting a service provider to Conduct Community Dialogue in Ma'an	Contract		0.25	0.25	0.25		0.25		1	179,688	179,688	179,688	-	-	-	100%			
Contracting a service provider to Conduct Community Dialogue in Tafilah	Contract		0.25	0.25	0.25		0.25		1	179,688	179,688	179,688	-	-	-	100%			
Contracting a service provider to Conduct Community Dialogue in Karak	Contract		0.25	0.25	0.25		0.25		1	179,688	179,688	179,688	-	-	-	100%			
Activity 2.1.4.2 Organizing multi-stakeholder climate-wise women forums																			
Climate-wise women forum	Forum				1		1	1	3	10,000	30,000	30,000	-	-	-	100%			

Table 46. Component 3 and PMC.

COMPONENTS, SUB-COMPONENTS, OUTPUTS AND ACTIVITIES	UNIT	Years							Final target	Unit cost (USD/unit)	Total Cost (USD)	Funding Sources				Share of funding sources (%)		
		1	2	3	4	5	6	7				Green Climate Fund (Grant)	Government	FAO	UNDP	Green Climate Fund (Grant)	Government	FAO
COMPONENT 3: Scaling-up climate adaptation																		
Outcome 3.1 By year 7 Gender sensitive resilience tools and practices to adapt to water scarcity are mainstreamed into the national policy/educational/administrative/social frameworks											3,771,781	3,421,781	-	350,000	-			
Output 3.1.1. By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated											2,383,281	2,108,281	-	275,000	-			
Activity 3.1.1.1 Technical assistance to the Ministry of Environment, the Ministry of Agriculture and the Ministry of Water and Irrigation to initiate the process of policy reform																		
Local Technical assistance	month/person	12	12	12	12	36	36	1	180	2,500	450,000	450,000	-	-	-	100%		
International Technical assistance	month/person	12	12	12	12	36	36	1	84	11,700	982,800	982,800	-	-	-	100%		
Field visits and travel for Local and ITA	Trip	6	4	4	4	4	4	4	30	500	15,000	15,000	-	-	-	100%		
Allowances for LTA and ITA	Days	52	72	72	72	72	72	52	464	261	121,104	121,104	-	-	-	100%		
Communication campaigns, traslations and multimedia	Lumpsum	0.5	0.5	0.5	0.5	0.5	0.5		3	15,000	45,000	45,000	-	-	-	100%		
Contingencies	Lumpsum	1			1				2	83,822	167,643	167,643	-	-	-	100%		
FAO technical assistance	lumpsum		0.2	0.2	0.2	0.2	0.2		1	100,000	100,000	-	100,000	-	-		100%	
ES safeguard specialist	lumpsum	1	1	1	1	1	1	1	7	25,000	175,000	-	175,000	-	-		100%	
Allowances of ES safeguard specialist and others	days	42	42	42	42	42	42	42	294	261	76,734	76,734	-	-	-	100%		
Activity 3.1.1.2 Technical Assistance to support the MWI in strengthening the enabling environment for promotion of reuse of reclaimed water																		
Contract with service provider to support MWI	Lumpsum	0.2	0.2	0.2	0.2	0.2			1	250,000	250,000	250,000	-	-	-	100%		
Output 3.1.2 By year 6 at least 6 national curricula of vocational schools (masonry, plumbrery and agriculture) and of specialized universities (agriculture, architecture, water engineering) are updated t											625,000	550,000	-	75,000	-			
Activity 3.1.2.1 Technical Assistance to the Ministry of Education and main Universities to update the national curricula																		
Contract with service provider to support the national curricula updating	Lumpsum				0.25	0.25	0.25	0.25	1	250,000	250,000	250,000	-	-	-	100%		
FAO support to the national curricula updating					0.25	0.25	0.25	0.25	1	75,000	75,000	-	-	75,000	-		100%	
Activity 3.1.2.2 Training for teachers and professors to enable the teaching and practice of the new curricula																		
Contract with service provider to provide training for teachers and professors	Lumpsum				0.25	0.25	0.25	0.25	1	300,000	300,000	300,000	-	-	-	100%		
Output 3.1.3 By year 7 at least 6440 persons (4 governorates, 16 provinces, 324 municipalities) and private sector engaged in climate change adaptation practices											763,500	763,500	-	-	-			
Activity 3.1.3.1 Local engagement and dissemination process																		
Conference	Conference	1			1				3	7,500	22,500	22,500	-	-	-	100%		
Workshops	Workshops	8	8	8	8	8	8	8	56	625	35,000	35,000	-	-	-	100%		
Publications	Lumpsum	1			1				3	15,000	45,000	45,000	-	-	-	100%		
Public consultations	Meetings	8	8	8	8	8	8	8	56	1,000	56,000	56,000	-	-	-	100%		
Contract with service provider for raising awareness and communication	Lumpsum	1	1	1	1	1	1	1	7	15,000	105,000	105,000	-	-	-	100%		
Activity 3.1.3.2 Technical Assistance to enhance local administration's and private sector actors' capacities to ensure compliance with national green construction and water																		
Contract with service provider for capacity development to ensure abidance to national green cons	Lumpsum		0.2	0.2	0.2	0.2	0.2		1	300,000	300,000	300,000	0	-	0	100%		
Activity 3.1.3.3 Technical assistance and training to civil society organizations																		
Contract with service provider to provide training to local institutions and civil society	Lumpsum		0.25	0.25	0.25	0.25			1	200,000	200,000	200,000	-	-	-	100%		
PROJECT MANAGEMENT																		
Project Management Unit (PMU) in operation									1		1,660,486	1,130,486	380,000	75,000	75,000			
Investment Costs											1,660,486	1,130,486	380,000	75,000	75,000			
Office equipment	lumpsum	1	1	1	1	1	1	1	7	5,000	35,000	35,000	-	-	-	100%		
FAO technical assistance to the PMU		1	1	1	1	1	1	1	7	10,714	75,000	35,000	-	-	75,000	-	100%	
UNDP technical assistance to the PMU	lumpsum	1	1	1	1	1	1	1	7	10,714	75,000	-	-	-	75,000	-		100%
Salaries																		
Project Manager	month	12	12	12	12	12	12	12	84	4,500	378,000	378,000	-	-	-	100%		
Procurement Specialist	month	12	12	12	12	12	12	12	84	2,750	231,000	231,000	-	-	-	100%		
Finance Manager	month	12	12	12	12	12	12	12	84	3,000	252,000	252,000	-	-	-	100%		
Administrative Assistance	month	12	12	12	12	12	12	12	84	1,300	109,200	109,200	-	-	-	100%		
Support Staff	month	12	12	12	12	12	12	12	84	1,100	92,400	92,400	-	-	-	100%		
Operating costs																		
Travel-Field per diems PMU key Staff	days	18	18	18	18	18	18	18	126	261	32,886	32,886	-	-	-	100%		
Office rent and utilities	lumpsum	1	1	1	1	1	1	1	7	14,000	98,000	-	98,000	-	-	-	100%	
Operating support MoE	lumpsum	1	1	1	1	1	1	1	7	40,286	282,000	-	282,000	-	-	-	100%	
TOTAL																		
											33,251,501	25,000,000	6,191,501	1,000,000	1,060,000			

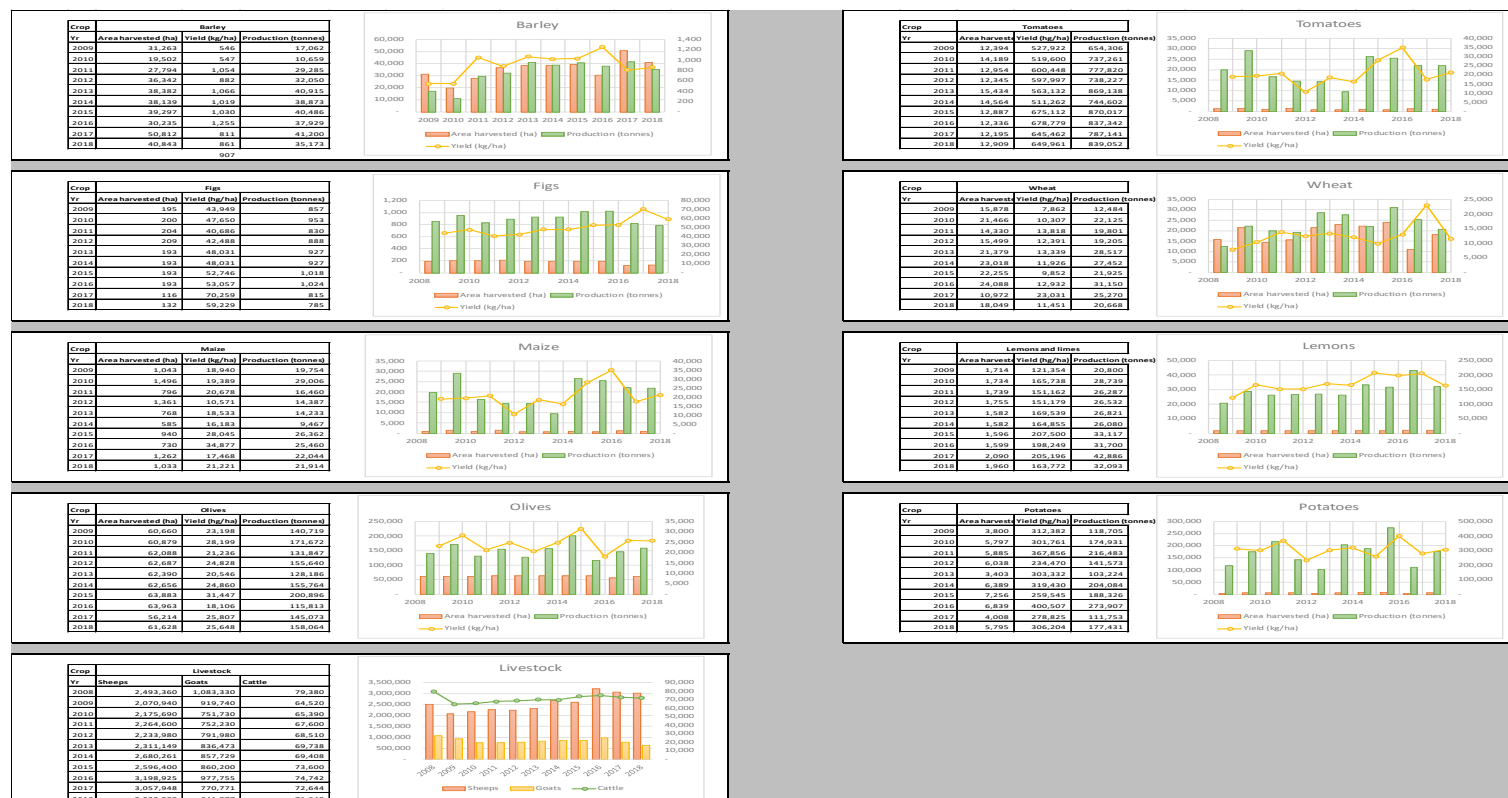
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Table 47. FAO and UNDP Contribution per activity.

FAO Contribution				
Outcome	Output	Activity	Item	Total
Outcome 2.1. Enhanced capacity of households to deal with climate change	Output 2.1.1 By year 7, 6,000 Farmers trained in climate resilient production practices through FFS (4050) and field days (1950)	Activity 2.1.1.1 Provide Technical assistance and oversight for climate change adaptation	Social inclusion and gender Specialist	\$ 175,000
		Activity 2.1.1.3 Training a team of Master Trainers/Facilitators	FAO support to the training of FFS master trainer	\$ 100,000
	Output 2.1.2 By year 7, 30 000 Farmers reached through e-extension	Activity 2.1.2.1 Developing climate-smart IT solutions for smart devices	FAO support to the Innovation hub for climart smart agriculture and water scarcity management and development of smart extension applications	\$ 200,000
	Output 2.1.3 By year 3, 400 Women trained as Change Agents for Climate Adaptation	Activity 2.1.3.4 Competitive selection of candidates for climate wise-women	FAO support to the competitive selection of candidates	\$ 50,000
		Activity 2.1.3.5 Trainings developed for climate wise-women	FAO Support to climate wise women trained	\$ 50,000
Outcome 3.1 By year 7 Gender sensitive resilience tools and practices to adapt to water scarcity are mainstreamed into the national policy/e ducational/administrative/social frameworks	Output 3.1.1. By year 6, specific policy and regulatory bottlenecks are identified and reforms initiated	Activity 3.1.1.1 Technical assistance to the Ministry of Environment, the Ministry of Agriculture and the Ministry of Water and Irrigation to initiate the process of policy reform	FAO technical assistance	\$ 100,000
			ES safeguard specialist	\$ 175,000
	Output 3.1.2 By year 6 at least 6 national curricula of vocational schools (masonry, plumbrery and agriculture) and of specialized universities (agriculture, architecture, water engineering) are updated to include climate smart agriculture, water efficiency and precision agriculture.	Activity 3.1.2.1 Technical Assistance to the Ministry of Education and main Universities to update the national curricula	FAO support to the national curricula updating	\$ 75,000
PROJECT MANAGEMENT			FAO technical assistance to the PMU	\$ 75,000
Total				\$ 1,000,000
UNDP Contribution				
Outcome	Output	Activity	Item	Total
Outcome 1.1 Enhanced water availability to address climate change risks	Output 1.1.1 By year 7 at least 8250 buildings retrofitted with water harvesting structures	Activity 1.1.1.4 Select beneficiaries, provide orientation on water conservation to households	UNDP site manager and operational support	\$ 485,000
Outcome 1.1 Enhanced water availability to address climate change risks	Output 1.1.3 By year 4, Landscape Resilience Investment Plan for part of the Dead Sea Basin	Activity 1.1.3.1 Establish plan objectives and criteria	UNDP support to the landscape resilience investment plan	\$ 500,000
PROJECT MANAGEMENT			UNDP technical assistance to the PMU	\$ 75,000
Total				\$ 1,060,000

5.2 Annex 2. Additional tables – EFA

Table 48. National Production (with FAOSTAT)



Source: Prepared under the basis of FAOSTAT.

Illustration 1. Wicking bed technologies



Source: NARC; 2020.

Table 49. Financial Model 1. Rainfed Barley (per hectare)

[illegible]

Table 50. Financial Model 2. Rainfed Wheat (per hectare)

[illegible]

Table 51. Financial Model 3.1 Olives irrigated (per hectare)

[illegible]

Table 52. Financial Model 3.2 Olives non-irrigated (per hectare)

Products	Unit	Unit price	Without project																				With project																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			0%																				90% 95% 100% 100%																			
Production	kg/ha	5	6	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	478	495.0	522.5	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	550.0	
Operational Cost	ha	5	169	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Establishing Cost	ha	5	193	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Building and other maintenance	ha	5	193	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Family labor	days	5	10	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30		
Land rent	ha	5	140	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Maintenance	ha	5	140	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Interest rate on operational costs	ha	5	68	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Variable Cost	ha	5	113.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Plowing	ha	5	34.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Ammonia	ha	5	50.00	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Macro and Micro element	ha	5	34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Herbicides	ha	5	32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Insecticide	ha	5	13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Labor	days	5	10	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3			
Fried container	ha	5	42	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Harvesting	days	5	11	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90			
Transporting	ha	5	13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Oil container	ha	5	85	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Milling Cost			10%																																							
Interest rate on variable costs	ha	5	82	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
Financial budget	Unit	Unit price	Without project																				With project																			
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			0%																				90% 95% 100% 100%																			
ITEM	USD		2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,722	2,874	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026			
Olives oil	Q	USD	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,626	2,722	2,874	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026	3,026			
Operational Cost	Q	USD	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,944	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951	2,951				
Establishing Cost	USD		169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169	169				
Building and other maintenance	Q	USD	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193	193				
Family labor	Q	USD	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	3																								

Table 53. Financial Model 4 Grapes (per hectare)

Products	Unit	Unit price	Without project																				With project																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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Grapes	kg	\$	2	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000

Table 54. Financial Model 5 Tomato (per hectare)

[illegible]

GCF Funding Proposal
Working Paper Costing and EFA

Table 55. Financial Model 6 Wicking beds (per Household)

Products	Unit	Unit price	Without project 1 to 15	With project														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Losses	5%																	
Full development				20%	30%	40%	50%	60%	70%	100%								
Production																		
Tomatoe	kg	0.7		3	7	17	25	42	49	70	70	70	70	70	70	70	70	70
Eggplant	kg	0.7		3	7	15	22	38	44	63	63	63	63	63	63	63	63	63
Lettuce	kg	1		1	2	4	6	10	11	16	16	16	16	16	16	16	16	16
Mint	kg	0.15		2	3	8	11	19	22	32	32	32	32	32	32	32	32	32
Corn	kg	1		0	1	1	2	3	4	5	5	5	5	5	5	5	5	5
Water melon	kg	0.5		1	2	5	7	12	14	20	20	20	20	20	20	20	20	20
Melon	kg	0.5		1	2	5	7	12	14	20	20	20	20	20	20	20	20	20
Investments																		
Wicking bed(Container)	kit	15		1				1	0	0	0	1	0	0	0	1	0	0
Pipe	unit	4		1				1	0	0	0	1	0	0	0	1	0	0
Elbow	unit	1		1				1	0	0	0	1	0	0	0	1	0	0
Fiber or mulch	unit	3		1		1		1	0	1	0	1	0	1	0	1	0	1
Costs																		
Tomato(day)	ls	0.1		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Eggplant(day)	ls	0.1		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Lettuce(week)	ls	0.1		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Mint	ls	0.02		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Corn	ls	0.02		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Water melon	ls	0.02		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Melon	ls	0.02		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Water (harvested from the rooftop)	ls	2.40		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Labor	day	10.00		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Total																		
Financial budget	Unit	Unit price	Without project	With project														
ITEM			1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sales				7	15	33	49	83	97	139	139	139	139	139	139	139	139	139
Tomatoe	JOD			2	5	12	17	29	34	49	49	49	49	49	49	49	49	49
Eggplant	JOD			2	5	11	15	26	31	44	44	44	44	44	44	44	44	44
Lettuce	JOD			1	2	4	6	10	11	16	16	16	16	16	16	16	16	16
Mint	JOD			0	1	1	2	3	3	5	5	5	5	5	5	5	5	5
Corn	JOD			0	1	1	2	3	4	5	5	5	5	5	5	5	5	5
Water melon	JOD			0	1	2	4	6	7	10	10	10	10	10	10	10	10	10
Melon	JOD			0	1	2	4	6	7	10	10	10	10	10	10	10	10	10
Investments	JOD		0	23	0	3	0	23	0	3	0	23	0	3	0	23	0	3
Wicking bed(Container)	JOD		0	15	0	0	0	15	0	0	0	15	0	0	0	15	0	0
Pipe	JOD		0	4	0	0	0	4	0	0	0	4	0	0	0	4	0	0
Elbow	JOD		0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0
Fiber or mulch	JOD		0	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3
Costs			0	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Tomato(day)	JOD		0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Eggplant(day)	JOD		0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lettuce(week)	JOD		0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Mint	JOD		0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Corn	JOD		0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Water melon	JOD		0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Melon	JOD		0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Water (harvested from the rooftop)	JOD		2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Labor																		
Total Production Costs			0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Income (after family labor)			50	-22	9	25	43	55	92	130	133	110	133	130	133	110	133	130
Incremental income				-72	-41	-25	-7	5	42	80	83	60	83	80	83	60	83	80
				0	0	0	0	0	0									
Returns on family labor WP	16																	
Return on family labor WP	10.0																	
% Increase	61%																	
Discount rate	9%																	
NVP @9%	\$179																	
FIRR	21.9%																	
Ratio B/C	15.22																	
NVPvc	\$45																	
NPVb	\$242																	
breakeven benefits	-81%																	
breakeven costs	437%																	

Table 56. Financial Model 7.1 Growbags 1

[illegible]

Table 57. Financial Model 7.2 Growbags 2

Resources			Milestone		Milestone																																																																																																			
Resource	Start	End	Start	End	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Project Management			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100		
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100				
Project Manager	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53																																																			

Table 58. Financial Model 8.1 Growbags 3

[illegible]

Table 59. Financial Model 8.2 Growbags 4

Products	Unit	Unit price	Without project 1to15	With project									
				1	2	3	4	5	6	7	8	9	10
Losses	5%			65%	80%	95%	100%						
Full development	10	500		15	18	22	23		23		23		23
Production cucumber (1year)	ton												
Inputs	kit	200		1					1				1
Pipes 5yr	unit	700		3									3
Tank 10yr	unit												
Iron GH body (10-12yr)	unit	200											
Iron GH cover (4yr)	unit	120											
Pump	unit	120											
Ventilation (2-8yr)	kit	250											
Costs				2					1		1		
Inputs									2				
Seeds (bag 500)	bag	80		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Fertilizers (kg)	kg	2		2	2	2	2	2	2	2	2	2	2
Pesticides / Fungicides	package	100		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Water consumption	m3	0.4		2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Compost	tonne	25		1	1	1	1	1	1	1	1	1	1
Sand	bag	35		1	1	1	1	1	1	1	1	1	1
Turf (5m)	set	120		0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Tools and materials													
Traps for insects	unit	10		2	2	2	2	2	2	2	2	2	2
Scissors (5yr)	unit	30		1				1	0	0	0	1	0
Horticulture tools (5yr)	kit	20		1				1	0	0	0	1	0
BRRS 1yr	unit	0.7		1000		1000		1000	0	1000	0	1000	
Gloves (4 per season)	pair	1.5		16	16	16	16	16	16	16	16	16	16
Safety equipment (glasses, waterproof) 3yr	kit	1		1	1	1	1	1	1	1	1	1	1
Plastic boots(2 yr)	pair	10		1	0	1	0	1	0	1	0	1	0
Others													
Electricity	month	10		12	12	12	12	12	12	12	12	12	12
Transportation	hour	100		4	4	4	4	4	4	4	4	4	4
Rent (1000 sq)	year	300		1	1	1	1	1	1	1	1	1	1
Family labor													
Sowing	days	10		4	4	4	4	4	4	4	4	4	4
Prepare land	days	10		12	12	12	12	12	12	12	12	12	12
Maintenance	days	10		120	120	120	120	120	120	120	120	120	120
Harvest	days	10		500	500	500	500	500	500	500	500	500	500
Total				650	650	650	650	650	650	650	650	650	650
Financial budget	Unit	Unit price	Without project 1to15	1	2	3	4	5	6	7	8	9	10
ITEM													
Sales	ton			7310	8120	10830	11300	11300	11300	11300	11300	11300	11300
Inputs	ton	0		860	0	0	0	200	0	200	0	200	1050
Pipes 5yr	ton	0		200	0	0	0	0	0	0	0	0	200
Tank 10yr	ton	0		150	0	0	0	0	0	0	0	0	150
Iron GH body (10-12yr)	ton	0		0	0	0	0	0	0	0	0	0	200
Iron GH cover (4yr)	ton	0		0	0	0	0	0	0	0	0	0	0
Pump	ton	0		0	0	0	0	0	0	0	0	0	0
Ventilation (2-8yr)	ton	0		0	0	0	0	0	0	0	0	0	0
Costs	ton	0		8400	7664	8374	7734	8424	7664	8424	7664	8424	7734
Inputs	ton	0		160	160	160	160	160	160	160	160	160	160
Fertilizers (kg)	ton	0		113	113	113	113	113	113	113	113	113	113
Pesticides / Fungicides	ton	0		50	50	50	50	50	50	50	50	50	50
Water consumption	ton	0		30	30	30	30	30	30	30	30	30	30
Compost	ton	0		25	25	25	25	25	25	25	25	25	25
Sand	ton	0		35	35	35	35	35	35	35	35	35	35
Turf (5m)	ton	0		40	40	40	40	40	40	40	40	40	40
Tools and materials	ton	0		20	20	20	20	20	20	20	20	20	20
Traps for insects	ton	0		30	0	0	0	30	0	0	0	30	0
Scissors (5yr)	ton	0		20	0	0	0	20	0	0	0	20	0
Horticulture tools (5yr)	ton	0		20	0	0	0	20	0	0	0	20	0
BRRS 1yr	ton	0		200	0	200	0	200	0	200	0	200	0
Gloves (4 per season)	ton	0		24	24	24	24	24	24	24	24	24	24
Safety equipment (glasses, waterproof) 3yr	ton	0		20	0	0	0	20	0	0	0	20	0
Plastic boots(2 yr)	ton	0		10	0	10	0	10	0	10	0	10	0
Others	ton	0											
Electricity	ton	0		120	120	120	120	120	120	120	120	120	120
Transportation	ton	0		40	40	40	40	40	40	40	40	40	40
Rent (1000 sq)	ton	0		300	300	300	300	300	300	300	300	300	300
Family labor	ton	0		0	0	0	0	0	0	0	0	0	0
Sowing	ton	0		40	40	40	40	40	40	40	40	40	40
Prepare land	ton	0		120	120	120	120	120	120	120	120	120	120
Maintenance	ton	0		1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
Harvest	ton	0		5000	5000	5000	5000	5000	5000	5000	5000	5000	5000

Table 60. Financial Model 9.1 Irrigated Alfalfa

[illegible]

Location and Date of Birth		Age		Gender		Marital Status		Religion		Education		Occupation		Income		Assets		Liabilities		Net Worth		Credit Score		Risk Rating	
City	State	Year	Month	Day	Sex	Married	Divorced	Widowed	Single	High School	College	Postgraduate	Self-employed	Employee	Annual	Monthly	Real Estate	Other Assets	Loans	Other Liabilities	Total	Score	Category		
Atlanta	GA	1980	01	15	M	Yes	No	No	No	High School	College	Postgraduate	Self-employed	Employee	\$50,000	\$4,167	\$150,000	\$20,000	\$50,000	\$10,000	\$140,000	720	Low		
Los Angeles	CA	1985	03	22	F	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$60,000	\$5,000	\$180,000	\$25,000	\$60,000	\$15,000	\$165,000	750	Low		
Chicago	IL	1975	05	10	M	Yes	No	No	No	High School	College	Postgraduate	Self-employed	Self-employed	\$70,000	\$5,833	\$200,000	\$30,000	\$70,000	\$20,000	\$180,000	780	Low		
Phoenix	AZ	1990	07	05	F	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$40,000	\$3,333	\$120,000	\$15,000	\$40,000	\$10,000	\$110,000	700	Low		
San Antonio	TX	1982	09	18	M	Yes	No	No	No	High School	College	Postgraduate	Self-employed	Self-employed	\$65,000	\$5,417	\$190,000	\$28,000	\$65,000	\$18,000	\$172,000	760	Low		
San Diego	CA	1978	11	03	F	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$55,000	\$4,583	\$170,000	\$22,000	\$55,000	\$12,000	\$158,000	740	Low		
San Jose	CA	1988	04	28	M	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$80,000	\$6,667	\$240,000	\$35,000	\$80,000	\$25,000	\$215,000	800	Low		
San Francisco	CA	1972	06	12	F	Yes	No	No	No	High School	College	Postgraduate	Self-employed	Self-employed	\$90,000	\$7,500	\$270,000	\$40,000	\$90,000	\$30,000	\$240,000	820	Low		
Seattle	WA	1983	08	01	M	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$68,000	\$5,667	\$205,000	\$30,000	\$68,000	\$20,000	\$185,000	770	Low		
Denver	CO	1979	10	25	F	Yes	No	No	No	High School	College	Postgraduate	Self-employed	Self-employed	\$75,000	\$6,250	\$225,000	\$35,000	\$75,000	\$25,000	\$200,000	790	Low		
Portland	OR	1986	12	10	M	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$52,000	\$4,333	\$158,000	\$20,000	\$52,000	\$15,000	\$143,000	710	Low		
San Carlos	CA	1991	02	08	F	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$45,000	\$3,750	\$135,000	\$18,000	\$45,000	\$12,000	\$123,000	680	Low		
San Ramon	CA	1987	05	15	M	Yes	No	No	No	High School	College	Postgraduate	Self-employed	Self-employed	\$62,000	\$5,167	\$186,000	\$27,000	\$62,000	\$17,000	\$169,000	750	Low		
San Marcos	CA	1984	07	20	F	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$58,000	\$4,833	\$174,000	\$23,000	\$58,000	\$13,000	\$161,000	730	Low		
San Gabriel	CA	1981	09	05	M	Yes	No	No	No	High School	College	Postgraduate	Self-employed	Self-employed	\$67,000	\$5,583	\$199,000	\$29,000	\$67,000	\$19,000	\$180,000	760	Low		
San Bruno	CA	1989	11	12	F	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$48,000	\$4,000	\$144,000	\$19,000	\$48,000	\$11,000	\$133,000	690	Low		
San Mateo	CA	1976	03	01	M	Yes	No	No	No	High School	College	Postgraduate	Self-employed	Self-employed	\$85,000	\$7,083	\$255,000	\$38,000	\$85,000	\$28,000	\$227,000	810	Low		
San Clemente	CA	1980	04	18	F	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$50,000	\$4,167	\$150,000	\$21,000	\$50,000	\$14,000	\$136,000	700	Low		
San Juan Capistrano	CA	1986	06	05	M	Yes	No	No	No	High School	College	Postgraduate	Self-employed	Self-employed	\$64,000	\$5,333	\$192,000	\$28,000	\$64,000	\$18,000	\$174,000	750	Low		
San Luis Obispo	CA	1983	08	22	F	No	No	No	No	College	College	Postgraduate	Employee	Employee	\$53,000	\$4,417	\$159,000	\$22,000	\$53,000	\$12,000	\$147,000	720	Low		

Table 62. Detailed aggregation tables

MEMBERSHIP RECORD		00-00	00-01	00-02	00-03	00-04	00-05	00-06	00-07	00-08	00-09	00-10	00-11	00-12	00-13	00-14	00-15	00-16	00-17	00-18	00-19	00-20	00-21	00-22	00-23	00-24	00-25	00-26	00-27	00-28	00-29	00-30	00-31	00-32	00-33	00-34	00-35	00-36	00-37	00-38	00-39	00-40	00-41	00-42	00-43	00-44	00-45	00-46	00-47	00-48	00-49	00-50	00-51	00-52	00-53	00-54	00-55	00-56	00-57	00-58	00-59	00-60	00-61	00-62	00-63	00-64	00-65	00-66	00-67	00-68	00-69	00-70	00-71	00-72	00-73	00-74	00-75	00-76	00-77	00-78	00-79	00-80	00-81	00-82	00-83	00-84	00-85	00-86	00-87	00-88	00-89	00-90	00-91	00-92	00-93	00-94	00-95	00-96	00-97	00-98	00-99	00-100	00-101	00-102	00-103	00-104	00-105	00-106	00-107	00-108	00-109	00-110	00-111	00-112	00-113	00-114	00-115	00-116	00-117	00-118	00-119	00-120	00-121	00-122	00-123	00-124	00-125	00-126	00-127	00-128	00-129	00-130	00-131	00-132	00-133	00-134	00-135	00-136	00-137	00-138	00-139	00-140	00-141	00-142	00-143	00-144	00-145	00-146	00-147	00-148	00-149	00-150	00-151	00-152	00-153	00-154	00-155	00-156	00-157	00-158	00-159	00-160	00-161	00-162	00-163	00-164	00-165	00-166	00-167	00-168	00-169	00-170	00-171	00-172	00-173	00-174	00-175	00-176	00-177	00-178	00-179	00-180	00-181	00-182	00-183	00-184	00-185	00-186	00-187	00-188	00-189	00-190	00-191	00-192	00-193	00-194	00-195	00-196	00-197	00-198	00-199	00-200	00-201	00-202	00-203	00-204	00-205	00-206	00-207	00-208	00-209	00-210	00-211	00-212	00-213	00-214	00-215	00-216	00-217	00-218	00-219	00-220	00-221	00-222	00-223	00-224	00-225	00-226	00-227	00-228	00-229	00-230	00-231	00-232	00-233	00-234	00-235	00-236	00-237	00-238	00-239	00-240	00-241	00-242	00-243	00-244	00-245	00-246	00-247	00-248	00-249	00-250	00-251	00-252	00-253	00-254	00-255	00-256	00-257	00-258	00-259	00-260	00-261	00-262	00-263	00-264	00-265	00-266	00-267	00-268	00-269	00-270	00-271	00-272	00-273	00-274	00-275	00-276	00-277	00-278	00-279	00-280	00-281	00-282	00-283	00-284	00-285	00-286	00-287	00-288	00-289	00-290	00-291	00-292	00-293	00-294	00-295	00-296	00-297	00-298	00-299	00-300	00-301	00-302	00-303	00-304	00-305	00-306	00-307	00-308	00-309	00-310	00-311	00-312	00-313	00-314	00-315	00-316	00-317	00-318	00-319	00-320	00-321	00-322	00-323	00-324	00-325	00-326	00-327	00-328	00-329	00-330	00-331	00-332	00-333	00-334	00-335	00-336	00-337	00-338	00-339	00-340	00-341	00-342	00-343	00-344	00-345	00-346	00-347	00-348	00-349	00-350	00-351	00-352	00-353	00-354	00-355	00-356	00-357	00-358	00-359	00-360	00-361	00-362	00-363	00-364	00-365	00-366	00-367	00-368	00-369	00-370	00-371	00-372	00-373	00-374	00-375	00-376	00-377	00-378	00-379	00-380	00-381	00-382	00-383	00-384	00-385	00-386	00-387	00-388	00-389	00-390	00-391	00-392	00-393	00-394	00-395	00-396	00-397	00-398	00-399	00-400	00-401	00-402	00-403	00-404	00-405	00-406	00-407	00-408	00-409	00-410	00-411	00-412	00-413	00-414	00-415	00-416	00-417	00-418	00-419	00-420	00-421	00-422	00-423	00-424	00-425	00-426	00-427	00-428	00-429	00-430	00-431	00-432	00-433	00-434	00-435	00-436	00-437	00-438	00-439	00-440	00-441	00-442	00-443	00-444	00-445	00-446	00-447	00-448	00-449	00-450	00-451	00-452	00-453	00-454	00-455	00-456	00-457	00-458	00-459	00-460	00-461	00-462	00-463	00-464	00-465	00-466	00-467	00-468	00-469	00-470	00-471	00-472	00-473	00-474	00-475	00-476	00-477	00-478	00-479	00-480	00-481	00-482	00-483	00-484	00-485	00-486	00-487	00-488	00-489	00-490	00-491	00-492	00-493	00-494	00-495	00-496	00-497	00-498	00-499	00-500	00-501	00-502	00-503	00-504	00-505	00-506	00-507	00-508	00-509	00-510	00-511	00-512	00-513	00-514	00-515	00-516	00-517	00-518	00-519	00-520	00-521	00-522	00-523	00-524	00-525	00-526	00-527	00-528	00-529	00-530	00-531	00-532	00-533	00-534	00-535	00-536	00-537	00-538	00-539	00-540	00-541	00-542	00-543	00-544	00-545	00-546	00-547	00-548	00-549	00-550	00-551	00-552	00-553	00-554	00-555	00-556	00-557	00-558	00-559	00-560	00-561	00-562	00-563	00-564	00-565	00-566	00-567	00-568	00-569	00-570	00-571	00-572	00-573	00-574	00-575	00-576	00-577	00-578	00-579	00-580	00-581	00-582	00-583	00-584	00-585	00-586	00-587	00-588	00-589	00-590	00-591	00-592	00-593	00-594	00-595	00-596	00-597	00-598	00-599	00-600	00-601	00-602	00-603	00-604	00-605	00-606	00-607	00-608	00-609	00-610	00-611	00-612	00-613	00-614	00-615	00-616	00-617	00-618	00-619	00-620	00-621	00-622	00-623	00-624	00-625	00-626	00-627	00-628	00-629	00-630	00-631	00-632	00-633	00-634	00-635	00-636	00-637	00-638	00-639	00-640	00-641	00-642	00-643	00-644	00-645	00-646	00-647	00-648	00-649	00-650	00-651	00-652	00-653	00-654	00-655	00-656	00-657	00-658	00-659	00-660	00-661	00-662	00-663	00-664	00-665	00-666	00-667	00-668	00-669	00-670	00-671	00-672	00-673	00-674	00-675	00-676	00-677	00-678	00-679	00-680	00-681	00-682	00-683	00-684	00-685	00-686	00-687	00-688	00-689	00-690	00-691	00-692	00-693	00-694	00-695	00-696	00-697	00-698	00-699	00-700	00-701	00-702	00-703	00-704	00-705	00-706	00-707	00-708	00-709	00-710	00-711	00-712	00-713	00-714	00-715	00-716	00-717	00-718	00-719	00-720	00-721	00-722	00-723	00-724	00-725	00-726	00-727	00-728	00-729	00-730	00-731	00-732	00-733	00-734	00-735	00-736	00-737	00-738	00-739	00-740	00-741	00-742	00-743	00-744	00-745	00-746	00-747	00-748	00-749	00-750	00-751	00-752	00-753	00-754	00-755	00-756	00-757	00-758	00-759	00-760	00-761	00-762	00-763	00-764	00-765	00-766	00-767	00-768	00-769	00-770	00-771	00-772	00-773	00-774	00-775	00-776	00-777	00-778	00-779	00-780	00-781	00-782	00-783	00-784	00-785	00-786	00-787	00-788	00-789	00-790	00-791	00-792	00-793	00-794	00-795	00-796	00-797	00-798	00-799	00-800	00-801	00-802	00-803	00-804	00-805	00-806	00-807	00-808	00-809	00-810	00-811	00-812	00-813	00-814	00-815	00-816	00-817	00-818	00-819	00-820	00-821	00-822	00-823	00-824	00-825	00-826	00-827	00-828	00-829	00-830	00-831	00-832	00-833	00-834	00-835	00-836	00-837	00-838	00-839	00-840	00-841	00-842	00-843	00-844	00-845	00-846	00-847	00-848	00-849	00-850	00-851	00-852	00-853	00-854	00-855	00-856	00-857	00-858	00-859	00-860	00-861	00-862	00-863	00-864	00-865	00-866	00-867	00-868	00-869	00-870	00-871	00-872	00-873	00-874	00-875	00-876	00-877	00-878	00-879	00-880	00-881	00-882	00-883	00-884	00-885	00-886	00-887	00-888	00-889	00-890	00-891	00-892	00-893	00-894	00-895	00-896	00-897	00-898	00-899	00-900	00-901	00-902	00-903	00-904	00-905	00-906	00-907	00-908	00-909	00-910	00-911	00-912	00-913	00-914	00-915	00-916	00-917	00-918	00-919	00-920	00-921	00-922	00-923	00-924	00-925	00-926	00-927	00-928	00-929	00-930	00-931	00-932	00-933	00-934	00-935	00-936	00-937	00-938	00-939	00-940	00-941	00-942	00-943	00-944	00-945	00-946	00-947	00-948	00-949	00-950	00-951	00-952	00-953	00-954	00-955	00-956	00-957	00-958	00-959	00-960	00-961	00-962	00-963	00-964	00-965	00-966	00-967	00-968	00-969	00-970	00-971	00-972	00-973	00-974	00-975	00-976	00-977	00-978	00-979	00-980	00-981	00-982	00-983	00-984	00-985	00-986	00-987	00-988	00-989	00-990	00-991	00-992	00-993	00-994	00-995	00-996	00-997	00-998	00-999	00-1000	00-1001	00-1002	00-1003	00-1004	00-1005	00-1006	00-1007	00-1008	00-1009	00-1010	00-1011	00-1012	00-1013	00-1014	00-1015	00-1016	00-1017	00-1018	00-1019	00-1020	00-1021	00-1022	00-1023	00-1024	00-1025	00-1026	00-1027	00-1028	00-1029	00-1030	00-1031	00-1032	00-1033	00-1034	00-1035	00-1036	00-1037	00-1038	00-1039	00-1040	00-1041	00-1042	00-1043	00-1044	00-1045	00-1046	00-1047	00-1048	00-1049	00-1050	00-1051	00-1052	00-1053	00-1054	00-1055	00-1056	00-1057	00-1058	00-1059	00-1060	00-1061	00-1062	00-1063	00-1064	00-1065	00-1066	00-1067	00-1068	00-1069	00-1070	00-1071	00-1072	00-1073	00-1074	00-1075	00-1076	00-1077	00-1078	00-1079	00-1080	00-1081	00-1082	00-1083	00-1084	00-1085	00-1086	00-1087	00-1088	00-1089	00-1090	00-1091	00-1092	00-1093	00-1094	00-1095	00-1096	00-1097	00-1098	00-1099	00-1100	00-1101	00-1102	00-1103	00-1104	00-1105	00-1106	00-1107	00-1108	00-1109	00-1110	00-1111	00-1112	00-1113	00-1114	00-1115	00-1116	00-1117	00-1118	00-1119	00-1120	00-1121	00
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6. References

- Abdulla, F. A. (2019), Rainwater harvesting in Jordan: potential water saving, optimal tank sizing and economic analysis, Urban Water Journal, DOI:10.1080/1573062X.2019.1648530
- Abdulla, F. A. (2020), Working Paper. Project Area Description, Climate Change, Rooftop water harvesting and Wastewater Reuse. FAOJO-DPI-GCF BRCCJ Design.
- Abdulla F. A. and Al-Shareef A. W. (2009) Roof rainwater harvesting systems for household watersupply in Jordan. Desalination 243 (2009) 195–207
- Al- Bakri J.T., Suleiman A., Abdulla F. and Ayad J. 2010. Potential impacts of climate change on the rainfed agriculture of a semi-arid basin in Jordan. Physics and Chemistry of the Earth (Accepted and available on online Doi:10.1016/j.pce.2010. 06.001).
- Amer, J. (2020) Socio-economic and livelihood analysis- Working Paper (BRCCJ)
- Department of Statistics (DOS), Annual Report, Amman, Jordan, 2018, www.dos.gov.jo.
- Department of Statistics (DOS) Household Expenditures & Income Survey (2017)
- Ministry of Water and Irrigation (MWI), National Water Master Plan, Ministry of Water and Irrigation, Amman, Jordan, 2005, www.mwi.gov.jo.
- Ministry of Water and Irrigation (MWI), Annual Report, Amman, Jordan, 2018, www.mwi.gov.jo
- Usama R. Alqalawi¹, Hail A. Jemel² and Ahmad A. Alwaked (2017) *The Optimal Choice of Exchange Rate Regime for Jordanian Dinar*. Journal of Economic Cooperation and Development, 38, 2, 109-134.
- Abu-Ghunmi, Diana, et al (2016). "Circular economy and the opportunity cost of not 'closing the loop' of water industry: the case of Jordan." Journal of cleaner production 131: 228-236.
- Albert, J., et al. (2013) Impact evaluation design report. Jordan compact – water network, wastewater network, and As-Samra expansion projects. Available from: <https://data.mcc.gov/evaluations/index.php/catalog/103/download/482>
- Alcon, Francisco, et al (2013). "Incorporating non-market benefits of reclaimed water into cost-benefit analysis: A case study of irrigated mandarin crops in southern Spain." Water resources management 27.6: 1809-1820.
- Hunter, Rachael G., et al (2019) "Municipal wastewater treatment costs with an emphasis on assimilation wetlands in the Louisiana coastal zone." Ecological Engineering 137: 21-25.
- Haddadin (2010) Water resources in Jordan. Issues in Water Resource Policy
- Kelpsaite, Lina (2016). Analysis of the Potential for Treated Wastewater Reuse from the MCC Jordan Compact Investment and Implications for the Compact's Economic Benefits. PhD diss., Duke University.
- Gittinger, J. Price (1985). Economic analysis of agricultural projects. Washington, DC: Economic Development Institute, World Bank. <http://documents.worldbank.org/curated/en/1985/01/437966/economic-analysisagricultural-projects>
- DPI/FAO (2020). Working Paper. Climate Change and Environment in Jordan, Dietmar Ueberbacher. Natural Resources and Climate Change Expert.
- Al Hiary, M (2020). Document shared with the DPI/GCF mission.

Al Hiary, M. et al (2019). Market Study and Marketing Strategy for Olive and Olive Oil Sector in the Southern Arid Part of Jordan. Journal of Agricultural Science and Technology Vol. 21((5)):1065-1077

Al Hiary, M. et al (2018) Sustainable Agricultural Production of Wheat and Sustainable Agricultural Production of Wheat and Forage Legumes (Common Vetch) under Conservation Agriculture Systems in Jordan. Conference: Eighth Scientific Agricultural Conference (ESAC-2018), At Jordan

Al Hiary, M. et al (2015) Socioeconomic assessment of wheat varieties and the adoption of recommended technologies in North Jordan. International Journal of Agricultural Sciences ISSN 2167-0447 Vol 5 (7) pp864-873

FAO (2015). Jordan. Water along the food chain. An analytical brief of selected food chains from a water perspective.

Hamdan, H (2018). NARC. FFS Component Report REGEF/IFAD.

MoE (2019) Green Climate Fund Country Programme for Kingdom of Jordan. GCF Readiness Program - Strengthening NDA of Jordan

IFAD Grant Document (2018). Use of genetic diversity and Evolutionary Plant Breeding for enhanced farmer resilience to climate change, sustainable crop productivity, and nutrition under rainfed conditions.

IFAD EFA Guidelines. Volume 1 (2015), Volume 2 (2019) and Volume 3 (2018).

FAO (2015) Water along the food chain in Jordan. FAO Investment Centre. FAO/EBRD Cooperation.

Leeters et al (2016). Export Value Chain Analysis Fruit and Vegetables Jordan. Netherlands Enterprise Agency.

Asian Development Bank (2013). Cost-benefit analysis for development: A practical guide. Manila. <http://www.adb.org/documents/cost-benefit-analysisdevelopment-practical-guide>

USAID (2010). Jordan Institutional Support and Strengthening Program (ISSP) | 2010–2015

Mourad et al (2010) Economic Value of Tree Fruit Production in Jordan Valley from a Virtual Water Perspective. Water Resources Management 24 (10):2021-2034

Tabieh, M., Al-Karablieh, E., Salman, A., Al-Qudah, H., Al-Rimawi, A. and Qtaishat, T. (2015) Farmers' Ability to Pay for Irrigation Water in the Jordan Valley. Journal of Water Resource and Protection, 7, 1157-1173.

Massimi, M; (2017) Asian Journal of Agricultural Extension, Economics & Sociology, Importance of Field Extension Training for Farmers of Alfalfa (*Medicago sativa* L.) to Adopt Weed Control Techniques

IMF (2020). Press release n°20/107, IMF Executive Board Approves US\$3 billion Extended Arrangement Under the Extended Fund Facility for Jordan

IMF (2020). Press release n°20/26, IMF Reaches a Staff-Level Agreement with Jordan on a Four-Year Extended Fund Facility

IMF (2019). Press release n°19/144, IMF Executive Board Completes Second Review Under the Extended Fund Facility for Jordan

IMF (2019). Press release n°19/435, IMF Staff Completes 2019 Article IV Mission to Jordan

Websites:

FAOSTAT: www.fao.org/faostat/en/#home

Comtrade: <https://comtrade.un.org/>

Central Bank of Jordan: <http://www.cbj.gov.jo/>

IMF: <https://www.imf.org/external/index.htm>

Department of Statistics- Jordan: http://dosweb.dos.gov.jo/censuses/agriculture-census/census2017_tables/

World Bank pink sheet: <http://pubdocs.worldbank.org/en/541851583268074222/CMO-Pink-Sheet-March-2020.pdf>