AGRICULTURE SECTOR

Green Growth National Action Plan 2021-2025

Ministry of Environment

GGGI

This report should be referenced as follows:

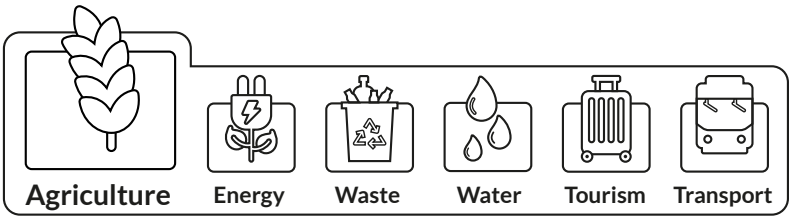
MoEnv. "Agriculture Sector Green Growth National Action Plan 2021-2025," 2020. Amman, The Hashemite Kingdom of Jordan.

His Majesty King Abdullah II Ibn Al Hussein

Economic leadership is by definition forward-looking. And forward-looking engagement will send a powerful message, a message of hope for my people and for yours.

AGRICULTURE SECTOR

Green Growth National Action Plan 2021-2025



Ministry of Environment

GGGI

Foreword by the Minister of Environment

The Ministry of Environment has been taking solid action to support Jordan's green growth transformation. In 2017, the Cabinet approved the National Green Growth Plan, which established green growth as a top national priority. Jordan's green growth vision – economic growth which is environmentally sustainable and socially inclusive – puts a strong emphasis on the importance of building resilience. This is needed for our economy to be able to absorb external shocks such as the negative consequences of COVID-19, and the ability to restore itself and continue growing.

In this context, I am proud to present the next step in implementing this vision, the Green Growth National Action Plan 2021-2025. The development of this plan lies at the heart of our continuous efforts and ambitions to support environmental and climate action in Jordan, while also achieving our sustainable economic growth objectives.

During the process of developing this plan, the Ministry of Environment has taken impressive efforts to strengthen its partnerships with the government institutions responsible for governing the six green economy sectors identified in the Jordan Vision 2025. These include: Agriculture, Energy, Waste, Water Tourism and Transport. Through a deeply collaborative approach, we were able to identify 86 priority enabling policy actions and projects that can trigger green growth. Many of these actions are ready for the support of donors, partners, and private sector investors.

Our world is facing the most challenging economic circumstances in a century as we work to contain the COVID-19 pandemic and adapt to a new normal way of life. As for our Kingdom, I am proud to say that the government acted decisively to stop the spread of the virus, implementing measures that saved potentially thousands of lives. However, response has come at a cost, with our economy and the economic security of our citizens once again at risk.

While infrastructure investments and donor support will be critical to stabilize this risk, private sector investment in the green growth vision is equally important. In many ways, the world is already moving toward a greener future. The spread of renewable energy, electric transportation, technology that saves water and energy resources, and innovations that promote the circular economy are taking off globally. The task for Jordan is harnessing these green developments into growth and employment-creation opportunities.

I would like to express my gratitude to the Global Green Growth Institute for their partnership and technical support in the process of developing Jordan's green growth agenda. The Ministry of Environment is committed to supporting green growth implementation in the 2021-2025 period, and beyond.

Dr. Saleh Al-Kharabsheh
Minister of Environment

Acknowledgements

The Green Growth National Action Plan 2021-2025 (GG-NAP) was developed by the Ministry of Environment with the support of the Global Green Growth Institute (GGGI), under the leadership of H.E Dr. Saleh Al Kharabsheh, Minister of Environment and benefited significantly from the effective directions of H.E. Eng. Ahmad Al Qatarneh, the Secretary General of the Ministry of Environment. Tremendous support was provided by the Technical Advisor to the Minister and Director of the Green Economy Unit, Dr. Jihad Alsawair.

Special acknowledgment goes to the sector focal points at the six key line ministries for their extensive input and coordination support throughout the development process. Appreciation also goes to the GGGI for their technical assistance throughout the project and their continued commitment to support Jordan's transition to a green economy.

The GG-NAP required a vast amount of expertise, research, consultation, and effort to complete. The finalization of the document would not have been possible without the dedication of all the individuals and organizations who worked together throughout the development process. We would like to express our deepest appreciation to those who have worked on shaping and guiding this action plan over the past two years.

Appreciation also goes to all the entities that were integral to the success of this report, as they generously provided the project team with their knowledge and expertise. These include: Prime Ministry, Ministry of Planning and International Cooperation, Ministry of Agriculture, Ministry of Energy and Mineral Resources, Ministry of Water and Irrigation, Ministry of Local Administration, Ministry of Transport, Ministry of Tourism and Antiquities, Ministry of Public Works and Housing, Ministry of Industry and Trade, Ministry of Finance, Jordan Renewable Energy and Energy Efficiency Fund, Cities and Villages Development Bank, Greater Amman Municipality, Aqaba Special Economic Zone Authority, Jordan Enterprise Development Corporation, the Jordan Chamber of Industry, Jordan Chamber of Commerce, Association of Banks in Jordan, Higher Council for Science and Technology, Royal Scientific Society, Department of Statistics, National Agriculture Research Center, Water Authority, the Jordan Valley Authority, GIZ, UNDP, NDC Partnership, EBRD, EU, AFD, FAO and World Bank.

Lastly, special thanks to the hundreds of individuals who participated in meetings, workshops, reviews, etc. for providing valuable information and feedback during the drafting process. This contribution in the interest of supporting the Government of Jordan and its green growth ambitions is sincerely appreciated.

Project Team

Ministry of Environment, Green Economy Unit

- Dr. Jihad Alsawair (Project Lead) / ***Technical Advisor to the Minister of Environment and Director of Green Economy Unit***
- Afrah Al Hajjaj / ***Green Economy Unit***
- Hanin Abuhamra / ***Green Economy Unit***
- Shan Bader / ***Green Economy Unit***

Global Green Growth Institute

- Ahmed Al Amra / ***Country Representative, GGGI-Jordan***
- Marshall Brown (Project Manager) / ***Senior Program Officer, GGGI-Jordan***

Sector Line Ministries, Green Growth Focal Points

- Mohammed El Shebli / ***Ministry of Agriculture***
- Shorouq AbdelGhani / ***Ministry of Energy and Mineral Resources***
- Nadia Al-Qudah / ***Ministry of Tourism and Antiquities***
- Raja' Bayer/ ***Ministry of Transport***
- Thaer Al-Momani/ ***Ministry of Water and Irrigation***
- Rushdi Sheikh/ ***Ministry of Local Administration***

GGGI's Team of National and International Green Growth Experts

- Dr. Maha Al-Zu'bi
- Majdi Salameh
- Rishi Basak
- Ingvild Solvang
- Jan Stelter
- Dr. James Seong-cheol Kang
- Diana Alejandra Quezada Avila
- Dr. Hussam Khasawneh
- Donovan Storey
- Christina Cheong
- Laila Kasuri
- Theresa Sayavong
- Mark Gibson
- Mahfuzur Rahman

Technical Support

Ministry of Environment

- Belal Shaqarin / ***Director, Climate Change Directorate***
- Belal Qtaishat / ***Director, Natural Resource Projection Directorate***
- Dr. Mohammad Khashashneh / ***Director, Hazardous Substances and Waste Management Directorate***
- Heba Zabalawi / ***Hazardous Substances and Waste Management Directorate***

Other National Institutions

- Sudki Hamdan / ***Department of Statistics***
- Dr. Nizar Haddad / ***National Agriculture Research Center***
- Nisreen Al Araj / ***Greater Amman Municipality***
- Wafa' Shehadeh / ***Ministry of Water and Irrigation***
- Naimeh Ibseileh / ***Water Authority of Jordan***
- Abeer Nassar / ***Jordan Valley Authority***
- Dr. Wael Ababneh / ***Ministry of Energy and Mineral Resources***
- Lina Mobaideen / ***Jordan Renewable Energy and Energy Efficiency Fund***
- Dr. Ayman Soleiman / ***Aqaba Special Economic Zone Authority***
- Hotaf Yassien / ***Aqaba Special Economic Zone Authority***
- Waed Al-Jaafreh / ***Ministry of Planning and International Cooperation***

Contents

List of Abbreviations

ACC	Agricultural Credit Corporation
ARFM	Agriculture Risk Management Fund
CO_2	Carbon dioxide
CPI	Consumer Price Index
DOS	Department of Statistics
EBRD	European Bank for Reconstruction and Development
EU	European Union
GAM	Greater Amman Municipality
GDP	Gross Domestic Product
GG-NAP	Green Growth National Action Plan
GGGI	Global Green Growth Institute
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GoJ	Government of Jordan
ICARDA	International Center for Agricultural Research in the Dry Areas
JCC	Jordan Cooperatives Corporation
JEA	Jordan Engineers Association
JEDCO	Jordan Enterprise Development Corporation
JEPA	Jordan Exporters and Producers Association
JFU	Jordan Farmers Union
JIC	Jordan Investment Commission
JICA	Japan International Cooperation Agency
JSMO	Jordan Standards and Metrology Organization
JVA	Jordan Valley Authority
M&E	Monitoring and evaluation
MENA	Middle East and North Africa
MoL	Ministry of Labor
MITS	Ministry of Industry and Trade and Supply
MoAg	Ministry of Agriculture
MoEnv	Ministry of Environment
MoF	Ministry of Finance
MOLA	Ministry of Local Administration
MOPIC	Ministry of Planning and International Cooperation
MoT	Ministry of Transport
MSMEs	Micro, Small and Medium Enterprises
$MtCO_2e$	Million metric tons of CO_2e emissions
MWI	Ministry of Water and Irrigation
NARC	National Agriculture Research Center
NASDS	National Agriculture Sector Development Strategy
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organization
PPP	Public-private partnerships
PM	Prime Ministry
R&D	Research and development
RSCN	Royal Society for the Conservation of Nature
SDG	Sustainable Development Goal
TBD	To be determined
ToT	Training of Trainers
USDA	United States Department of Agriculture
WFP	World Food Programme

About the Green Growth National Action Plan 2021-2025

Jordan's primary national development strategy Jordan Vision 2025 has set high ambitions for the country's socioeconomic development in the 2015-2025 period. With this strategy, Jordan hopes to achieve an economic growth rate of 7.5% in 2025, while striving to bring the poverty and unemployment rates as low as 8% and 9.17%[1], respectively. To achieve this vision, the government has defined a set of priorities and actions based on strong private sector development and resilience to external economic shocks. While the environment and climate change are not central features in the Jordan Vision 2025, several environmental priorities are addressed, including climate change adaptation, water and energy efficiency, waste management and natural resource protection. Importantly, the document calls for the development of the green economy in six targeted sectors: Energy, Transport, Water, Waste, Agriculture and Tourism.[2]

Throughout 2018 and 2019, Jordan's economy experienced a steady but low growth, with real GDP at just under 2.0%. Substantial efforts have been taken to address the central government's debt, which reached 99.1% in 2019, including through introducing fiscal reforms such as the passage of the 2019 Income Tax Law.[3] However, in early 2020, Jordan, like the rest of the world, was shaken by the global COVID19 pandemic. The implementation of public health measures to limit the spread of the virus brought the economy to a standstill, leaving many Jordanians worse-off.[4] This new economic situation poses a significant risk to Jordan in the short term. With an unemployment rate of 19%[5] at the end of 2019 and a slowdown of business-as-usual economic activity, families and small business will struggle to make ends meet.[6] High public debt and a likely reduction in foreign investment and tourism sector revenues will further test the long-term resilience of the economy. The economy is now estimated to shrink by about 3.5%, unemployment is expected to exceed 20%, and pressures on natural resources (particularly water) and vulnerable communities to intensify.[7]

This unprecedented set of circumstances is a serious challenge in the short term, but it presents an opportunity for the Government of Jordan to refocus its efforts on designing an economic growth approach that will foster long-term resilience. Green growth is one strategic approach that can support this effort. The Ministry of Environment began developing the Green Growth National Action Plan 2021-2025 in late 2018 as a next step toward implementation of the recommendations in the National Green Growth Plan, under the request of the Cabinet of Ministers. The GG-NAP outlines sector-level green growth frameworks and actions for the Agriculture, Energy, Tourism, Transport, Waste and Water sectors to support implementation of Jordan's green growth vision and strengthen future ability to recovery and contain shocks from catastrophic events such as COVID 19.

The Green Growth National Action Plan 2021-2025 lays out pathways for sustainable development that will increase resilience, strengthening Jordan's capacity to contain shocks and recover from catastrophic events such as COVID-19.

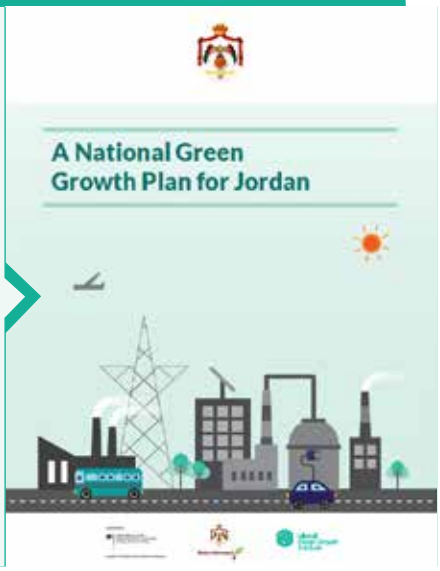
[1] GoJ. "Jordan 2025: A National Vision and Strategy," 2015.
[2] GoJ. "Jordan 2025: A National Vision and Strategy," 2015.
[3] The World Bank. "Jordan's Economic Update — April 2020," 2020.
[4] Reuters. "Many Jordanians struggling as country emerges from COVID-19 lockdown, U.N. agency says," 2020.
[5] Department of Statistics, 2019.
[6] UNDP. "Impact of COVID-19 on Households in Jordan",2020.
[7] The World Bank. "Jordan's Economic Update — April 2020," 2020.

Green growth, defined as **"Economic Growth that is environmentally sustainable and socially inclusive"**,[8] is a multi-sector development approach that is aligned with both the 2030 Sustainable Development Agenda and Jordan's Nationally Determined Contributions (NDC) under the Paris climate change agreement of 2015. In 2017, as a first step towards achieving green growth in Jordan, the Cabinet of Ministers approved the report "A National Green Growth Plan for Jordan" (NGGP). Having received a special mention by the League of Arab States for being a best practice example to be replicated in the region, the NGGP assesses Jordan's green growth potential and creates a roadmap to achieve a green economy transition in Jordan through strategic direction and recommendations (Box 1).

BOX 1
About the National Green Growth Plan for Jordan

The NGGP charts out a plan for Jordan to achieve an expanding yet sustainable and resilient economy that ensures the creation of green jobs for its citizens and increased investment in green projects. The NGGP uses a cost-benefit analysis approach to identify the challenges and opportunities for project implementation and focuses on tackling these barriers in the six green growth sectors: Agriculture, Energy, Tourism, Transport, Waste and Water. **Four driving principles of green growth are identified and mainstreamed across the actions in the Green Growth National Action Plan 2021-2025:**

- Transparent governance processes and enforcement of legislation
- Mechanisms to incentivize green growth
- Integrated planning processes that value societal impacts
- Behavior shifts and capacity building



To achieve the strategic vision laid out in the NGGP, the Ministry of Environment (MoEnv) worked in partnership with key national stakeholders to develop the **Green Growth National Action Plan 2021–2025** (GG-NAP). The GG-NAP is presented through a series of six national action plans that serve as sector-level green growth agendas. Each GG-NAP provides implementable actions to achieve the five national green growth objectives and embody the four driving principles of green growth implementation (see Box 2). Detailed descriptions of priority policy and investment actions are included in the sector action plans, which will serve as the core of Jordan's green growth, climate change and sustainable development agendas in the 2021 to 2025 period. Some of these are already under consideration by donors and investors. Many are included in Jordan's NDC Action Plan and are climate finance opportunities.

[8] Global Green Growth Institute. "GGGI's Strategy 2030," 2019.

BOX 2
Why the Green Growth National Action Plan 2021-2025?

The next step towards implementing the recommendations of the National Green Growth Plan for Jordan, the Action Plan for Agriculture, Energy, Tourism, Transport, Water, and Waste sectors:

1. **Elaborates and mainstreams green growth, climate change and sustainable development objectives into sectoral strategic frameworks.** This will encourage formulation of greener projects, and the implementation of policies that will strengthen the enabling environment for greener investment and private sector development. These priorities are aligned with the SDGs and the NDC Action Plan[9] as well as national sector-level priorities, which will further prepare the government to mainstream sustainable development into the post-*Jordan Vision 2025* national development plan.

2. **Strengthens cross-sector collaboration.** Multi-stakeholder coordination and collaboration is central to designing and implementing green growth actions, as it can maximize co-benefits. The overall development process and the actions in each sectoral plan were intentionally designed to enhance such collaboration. Such activities lead to increased awareness and behavior change among decision makers, which can further strengthen the enabling environment for future investment in green growth.

3. **Emphasizes the importance of improving the enabling environment for green growth.** During the initial phase of green growth implementation in Jordan, substantial focus on the enabling environment is needed. Each action description identifies the enabling actions (such as supporting technical assistance programs) required for the responsible institution to be more successful in securing investment for implementation – either from public budget, private sector investors or donors.

The development of the action plan was undertaken through a highly collaborative approach between the Ministry of Environment and the line ministries responsible for guiding each sector. Sector-level green growth focal points were established and ministerial leadership was engaged through the Higher Steering Committee for Green Economy to secure endorsement. This experience demonstrated the important and growing role the Ministry of Environment plays in facilitating action across different issue areas. The network of green growth and climate action advocates developed in recent years is a powerful tool for implementing green growth in Jordan.

The GG-NAPs were developed with technical support from the Global Green Growth Institute (GGGI), who worked with the Ministry of Environment to conduct wide-ranging stakeholder consultations in 2018 and 2019. The strategic objectives, sector sub-objectives and actions were identified and formulated through an iterative process linked as closely as possible to existing sectoral priorities. Non-government stakeholders and experts were also consulted to ensure alignment with broader sectoral priorities, and to bridge local context and international best practice.

[9] Clima-Med EU. "Jordan approves NDC Action Plan to achieve the implementation of its commitments to the Paris Agreement," 2019.

Figure 1 shows a summary of the green growth planning and implementation in Jordan.

FIGURE 1
Green Growth Planning and Implementation in Jordan

Executive Summary

The **Agriculture Sector Green Growth Action National Action Plan 2021-2025 (GG-NAP)** outlines a green growth framework and actions for the sector aligned with the National Green Growth Plan (NGGP), Jordan Vision 2025, and Nationally Determined Contributions (NDCs) under the Paris agreement.

At the heart of the green growth approach lies the leveraging of the sector's resilience through economic growth that is environmentally sustainable and socially inclusive. The GG-NAP outlines five national green growth objectives on which the *Agriculture Sector GG-NAP* was developed:

1. Enhance Natural Capital
2. Sustainable Economic Growth
3. Social Development and Poverty Reduction
4. Resource Efficiency
5. Climate Change Adaptation and Mitigation

From these five national objectives, the *Agriculture Sector GG-NAP* identifies 17 sector sub-objectives that serve to mainstream the overarching green growth objectives into agriculture sector policies and investments.

Agriculture-based revenues are critical to Jordan's economy, contributing to 28% of GDP and an estimated 18% of total exports.[10] Beyond the economy, however, the agriculture sector is a critical enabler of employment, rural development and food security, as well as being a locus for addressing many of the environment and climate change related challenges facing the country. The government aims to improve the exportability of its agricultural goods while at the same time coping with climate change and achieving its Sustainable Development Goals, triggering a re-examination of the business-as-usual approach.

While overall production and value-added has increased in recent years, the disorganization of the market is seriously impeding the sector's ability to generate revenues and create jobs. Agricultural productivity is determined by a combination of three factors: quantities of inputs used for production, the quantity of agriculture commodities grown, and the prices at which those products are sold in the market.[11] On all counts, Jordan is exposed to technical and administrative challenges that result in lower productivity growth than other countries in the region.

As a response to the COVID-19 pandemic, the Ministry of Agriculture is in the process of revising and updating its guiding strategy, the *National Agriculture Sector Development Strategy 2016-2025*. This revision will aim to increase the food security and economic development impacts of the sector. Environmental pressures play a major role in Jordan's future growth and boosting trade of agricultural products will require the development of sustainable value chains.[12] Implementing an inclusive green growth approach can support this objective by transitioning toward more evidence-informed decision making and holistic policy making.

In addition to enhancing coordination and strategic positioning for Jordan's agricultural products externally, leveraging Jordan's natural resource and environmental challenges into growth opportunities is at the heart of the *Agriculture Sector GG-NAP*. Key contributions to the agriculture sector's development include:

- Increase investment in future-oriented techniques, technologies, and business models that will contribute to sectoral growth;
- Improve the processes and tools at the government's disposal for sectoral planning across the full agricultural and food production value chain, from farm to market;
- Reduce the environmental impact of the sector by mainstreaming landscape restoration, forestry, and resource efficiency measures into agriculture sector activities;
- Increase opportunities for farmers and rural communities to improve their skills and access to finance to promote sustainable livelihoods and decent, green jobs in the sector.

The Ministry of Environment and the Ministry of Agriculture worked in partnership with the support of national stakeholders and the Global Green Growth Institute to identify 14 priority actions to achieve green growth through the agriculture sector as shown in Table 1. The implementation of these actions is estimated to cost USD 193,900,000, which will require a mix of public, private sector and donor support for implementation. The actions include:

- **7 investment preparation and demonstration actions.** These projects are at various levels of readiness: some require feasibility analysis, while others are investment-ready. Many are suitable

[10] Alghad. "King's directives foresee the importance of the agricultural sector in achieving food security," 2020.
[11] Akroush, Samia Nadeem, Boubaker Dhehibi, and Aden Aw-Hassan. "Agricultural Growth Accounting and Total Factor Productivity in Jordan." *International Journal of Productivity Management and Assessment Technologies* 4, no. 1 (2016): 1–14.
[12] Center for International Development, Harvard. "Jordan: The Elements of a Growth Strategy." Working Paper for the London 2019 Growth and Opportunity Summit. 2019.

candidates for public-private partnerships or direct private sector investment, and others are opportunities to leverage climate finance.

- **7 enabling policy and institutional reform actions.** Given current gaps in available fiscal resources, these actions intend to attract investment by addressing policy barriers and capacity gaps that lead to higher costs, risk levels or uncertainty in decision making. These include programs to support innovation, institutional reform and coordination.

9 of these 14 actions contribute to the objective of Climate Action Adaptation and Mitigation, considered to be "Climate Action Priorities", some of which can also be found in Jordan's NDC Action Plan and the forthcoming Green Climate Fund Country Programme.

TABLE 1
Summary of Jordan's Agriculture Sector Green Growth Action Plan 2021-2025

#	Action Title	Total Estimated Implementation Cost (USD)	Relevant Green Growth Objectives				
			Enhanced Natural Capital	Sustainable Economic Growth	Social Development and Poverty Reduction	Resource Efficiency	Climate change Mitigation and Adaptation
AG01	Design and implement capacity building program for green growth planning and implementation in the agriculture and forestry sector	1,500,000	x	x	x		
AG02	Mainstream green growth into the provision of agriculture extension services and explore options to improve their long-term sustainability	5,000,000	x		x	x	x
AG03	Map and optimize research to impact pathways to improve relevance of innovation efforts in the agriculture sector	2,000,000		x	x	x	x
AG04	Undertake sector reforms to improve access to finance for small farmers	3,500,000		x	x	x	x
AG05	Develop a flexible crop planning and variety selection methodology and decision-making process based on crop-per-drop and economic competitiveness	7,500,000		x	x	x	x
AG06	Design and implement program to support demonstration resource efficiency projects in the olive cultivation and oil production sector	25,000,000		x		x	
AG07	Develop and implement pipeline of projects (all sizes) and policy recommendations to increase use of aquaponics and hydroponics in urban and rural areas	21,000,000	x	x	x	x	
AG08	Conduct national prefeasibility and market assessment to measure and leverage agriculture sector biowaste to resource potential	11,500,000	x	x		x	
AG09	Develop a long-term agriculture sector market development startegy and action plan (rationalizing and directing domestic consumption, export, imports)	2,000,000		x			x
AG10	Upgrade packaging, scaling, storage and cooling of fruits and vegetables managed by the private sector	15,200,000		x	x	x	
AG11	Promote the development of organic agriculture through knowledge exchange and market development	1,700,000	x	x	x		
AG12	Estabilish an agricultural insurance company and develop agricultural risk mitigation strategy	52,000,000		x	x		x
AG13	Develop and Implement a National Afforestation Program in Jordan	40,000,000		x	x	x	x
AG14	Support rural green growth and employment through ecosystems restoration	6,000,000	x		x		x

1. A Green Growth Framework for the Agriculture Sector

Green growth is a new strategic approach for the Government of Jordan (GoJ) that integrates principles of inclusive, sustainable economic growth into the existing national context and priorities. Implementing this green growth approach will allow Jordan to achieve its socioeconomic development targets while simultaneously addressing environmental risks and climate change – all of which are critical to achieving the Sustainable Development Goals (SDGs), as shown in Figure 2 below. At the outset of the green growth planning process, visioning exercises and consultations were held with national stakeholders through which **five national green growth objectives** were established.[13] These objectives reflect Jordan's unique institutional setup, political and economic realities, and long-term growth ambitions. National-level plans and strategies were reviewed and used as inputs to guide and shape the objectives, which were later developed into sector-level sub-objectives (see Chapter 3). *The Agriculture Sector Green Growth National Action Plan (GG-NAP) 2021-2025* was developed as a partnership between the Ministry of Environment (MoEnv) and the Ministry of Agriculture (MoAg), with green growth focal points established within the MoAg and cooperation with the National Agriculture Research Center (NARC) to ensure consistent feedback from the technical and management levels. Figure 3 shows the process for developing the agriculture sector GG-NAP.

FIGURE 2
Relationship between the Five National Green Growth Objectives and SDGs

[13] This process reflected and built on the 5 green growth outcomes proposed in the National Green Growth Plan.

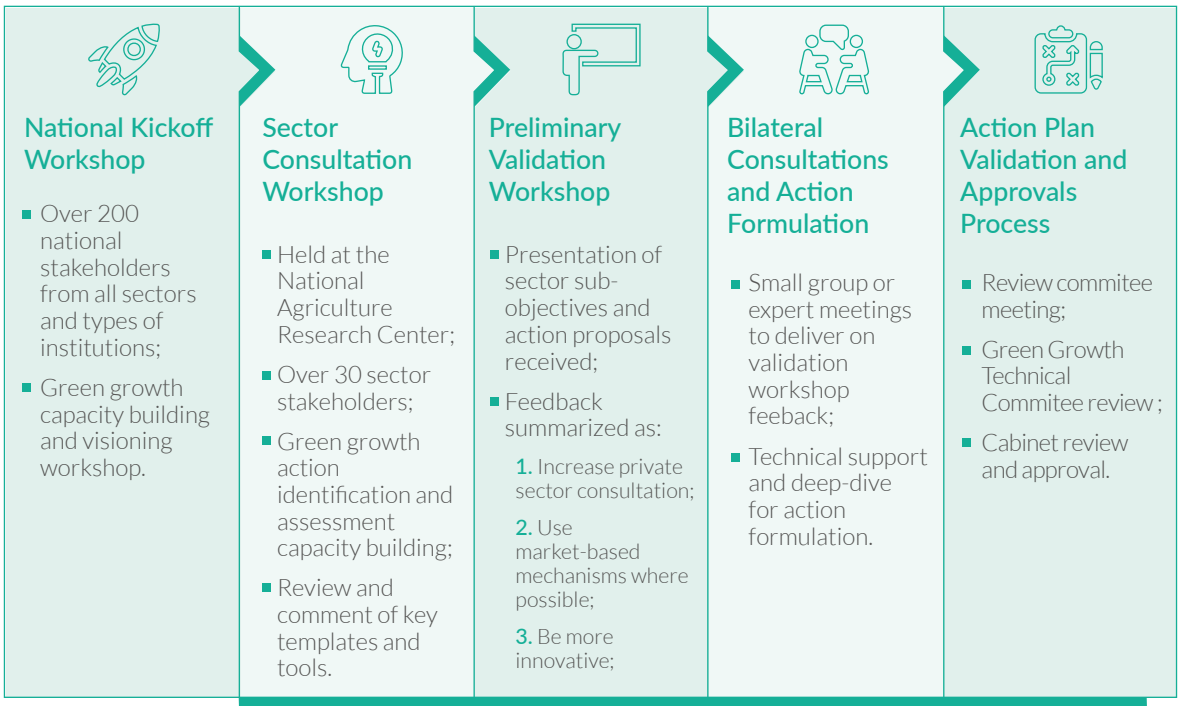


FIGURE 3
Process for Developing the *Agriculture Sector GG-NAP*

The Agriculture Sector covers all agricultural activities related to food and livestock production, research, innovation and extension, marketing, export, and quality control as well as forestry and natural resource development required for the sector to operate. The following sections describe the relationship between each of Jordan's national green growth objectives and the agriculture sector. An assessment of Jordan's performance against these objectives in Jordan's agriculture sector follows in Chapter 2.

1.1 Enhanced Natural Capital

Jordan's first national green growth objective is to enhance the country's natural capital. For that purpose, it aims to improve the quality and quantity of natural resources used to generate economic growth and provide ecosystem services that support economic activities.

Natural resources are assets that, when carefully managed and maintained as with built infrastructure investments or human resources, are more easily protected and regenerated. Therefore, to achieve the objective of enhancing the stock of natural capital, government and private sector must commit to valuing natural resources for their full contribution to economic and social development. From this commitment, more efficient and effective use of natural resources in production and consumption can take place, enabling sustainable development. Policymaking (strategies, plans, laws, regulations, etc.) and investment decision making processes that capture the full value of natural capital can be instrumental to preserving and enhancing the natural environment and achieving more sustainable development outcomes.

The productivity and resilience of the agriculture and forestry sectors are dependent on a stable supply and quality of natural resources. For example, insufficient water supply for irrigation, degraded soil quality (either naturally or due to pollution), and limited biodiversity are known barriers to increased agricultural productivity. Even with new technology, chemicals, and farming techniques advancing the resilience of the sector, nature-based solutions and implementation of ecosystems-wide approaches are more impactful and economically efficient ways to improve agricultural productivity and increase forest cover in the medium to long term.

Conversely, water and soil quality, as well as biodiversity levels, are heavily impacted by the activities of the agriculture and forestry sectors. For example, on-farm use of inorganic fertilizers and pesticides can reduce native species of plants and animals, and leak into the aquifers causing pollution of the scarce water resources. This presents a health hazard to humans and increases the financial and economic burden on governments to rehabilitate such natural assets. To address this situation, natural capital protection

should be prioritized in national and agricultural sectoral economic development planning because of its contribution to the economy and livelihoods, and its ability to reduce the total long-term cost of agricultural production and forestry.

Sustainable Development Goals: 6 (Clean Water and Sanitation), 14 (Life below Water), 15 (Life on Land).

1.2 Sustainable Economic Growth

Jordan's second national green growth objective is to ensure sustainable economic growth. In particular, the aim is to improve the enabling environment for the creation of long-term, inclusive socioeconomic development, as detailed in the Jordan Vision 2025.

Achieving this objective requires the government to maintain a deep understanding of the economy and the role of policy-based incentives in removing barriers to strong and equitable growth. Government must lead in organizing and reinforcing markets, rationalizing government investment, promoting innovation, supporting the development of a competitive private sector while achieving sustainable consumption and production. Government must also ensure that fiscal and market-based mechanisms intended to increase private sector investment are effective and efficient. Good governance is also a critical component of this objective, and green growth requires leaders committed to maintaining transparency, accountability and strong institutions. Finally, investment in the future, through education and research and development (R&D) are also strong enablers of long-term green growth.

The agriculture and forestry sectors can have a significant impact on sustainable economic growth. As most economies grow, the agriculture sector's share of gross domestic product (GDP) tends to decrease. Yet, even in the largest economies, the agriculture sector remains important because it ensures food security, and in many cases helps sustain rural livelihoods and preserve social and cultural traditions. As agriculture sectors modernize, innovation and technology can increase the value-added and the economic impact of the sector. Emerging economies face substantial challenges maintaining or transitioning toward higher value-added and export-orientation with the agriculture sector. For this reason, the policies and incentives governing the sector must encourage private sector investment in innovation, training, resource efficiency, and marketing capacity.

As environmental, social and economic factors place a greater number and increasingly complex mix of pressures on political systems and food production processes globally, the government's ability to quickly understand and respond to root causes is critical. Agriculture, water and environment sector decision-makers must be familiar with agricultural business and markets if they are to effectively internalize and address the sector's negative externalities on natural capital with policies and incentives. To achieve this, they must continuously improve technical expertise and remain committed to implementing robust decision-making processes that promote transparency. Access to data for evidence-based decision making, coupled with accountability through enforcement, are also important. Non-governmental organizations and research institutions are, therefore, critical links in the problem-solving chain.

Private sector investment in agricultural innovation and business sustainability is critical. Healthy public-private dialogue and partnerships are an enabler of policy implementation. Private sector investors (domestic and foreign), as mostly profit seekers, aim to avoid and mitigate risks. Accordingly, they desire to trust the decision-making process, and they need access to the necessary information and incentives to make profitable investments that will achieve the government's desired policy objectives. Agriculture sector investors, therefore, will have a substantial impact on the development of the sector and its ability to contribute to long term economic growth. Government must be willing and able to incorporate private sector needs and perspectives into their decision-making criteria and must support the organization of markets to ensure maximum economic efficiency.

Sustainable Development Goals: 8 (Good Jobs and Economic Growth), 9 (Industry, Innovation and Infrastructure), 16 (Peace, Justice and Strong Institutions).

1.3 Social Development and Poverty Reduction

Jordan's third national green growth objective is to achieve social development and poverty reduction. To this end, it aims to increase the equity with which the benefits of economic development and access to services are distributed across society.

Social development and poverty reduction are central concepts to Jordan's long-term development agenda and are a core component of inclusive green growth. Achieving this objective requires special attention to reducing inequalities in society, unlocking access to opportunity and extending the benefits of growth to all members of society. Gender equality and women's empowerment are policy agendas that help support social development and poverty reduction, and they are a critical part of overall economic growth. A 2015 McKinsey study found that women generate only 37% of global GDP, but that closing this gap could add between USD 12 and 28 trillion to the global economy.[14] In the Middle East and North Africa (MENA) region, women generate only 18% of GDP, suggesting greater inclusion is a major economic growth opportunity. Furthermore, access for marginalized groups and those excluded from markets, services and spaces are required for sustainable growth. Accordingly, green growth recognizes women and men with a sense of equity, and the poor and marginalized as not simply vulnerable, but as active agents of change for more sustainable growth.

Innovation, skills development and education are essential to achieve social development and poverty reduction through the agriculture sector. Access to education and technical-vocational skills training is a well-established contributor to economic opportunity; the more skilled a rural farmer is about sustainable agriculture, the more economically productive and environmentally friendly their agriculture ventures can be. Second, education systems have an important role in developing a world-class agriculture sector. Youth and students should be aware of the importance of the sector and encouraged to open businesses and innovate processes to move the sector towards greater efficiency and profitability, and ultimately, improved resilience. At the same time, the rural labor force should be given the opportunity to migrate or diversify into non-farm activities.[15] Studies show, for example, that investment in agriculture has an economy-wide multiplier effect of roughly 4 to1 – meaning that each dollar of investment in capital for agriculture production returns four dollars to the Jordanian economy.[16] This return is in terms of both productivity as well as the multiplier effects of job-creation. Therefore, increasing access to finance and investment in technology now can provide the type of long-term sector growth governments desire.

Because both rates of poverty and employment in agriculture tend to be higher in rural areas, governments must have strongly linked and mutually reinforcing agriculture and rural development agendas. Though agriculture may seem to be primarily a rural economic opportunity, it is in fact enmeshed with the culture of rural communities, and an important part of social relationships and cultural development. This means that agriculture sector policy and investment can be designed to protect and empower vulnerable individuals, including women, children and youth, minorities and displaced persons. Women face significant social, economic and political barriers that negatively affect coping capacities under extreme environmental conditions. Women carry most of the burden and responsibility to secure water, food, and fuel; with unequal access to resources, barriers to decision-making processes and limited mobility, women in rural areas are placed in a position wherein they are disproportionately affected by climate change.[17]

A strong environmental and social safeguards regime can help ensure greater access to opportunities, but systematic consultation and inclusion in the policy making process is also critical; their inclusion can support the development of more relevant policies and regulations that can protect and empower workers to ensure that work in the agriculture sector can lead to poverty reduction.

Sustainable Development Goals: 1 (No Poverty), 4 (Quality Education), 5 (Gender Equality), 10 (Reduced Inequalities).

[14] McKinsey Global Institute. "How advancing women's equality can add $12 trillion to global growth," 2015.
[15] FAO. "Ending poverty and hunger by investing in agriculture and rural areas,"2017.
[16] The World Bank. "The Role of Food and Agriculture for Job Creation and Poverty Reduction in Jordan and Lebanon," 2018.
[17] The World Bank. "The Role of Food and Agriculture for Job Creation and Poverty Reduction in Jordan and Lebanon," 2018.

1.4 Resource Efficiency

Jordan's fourth national green growth objective is to achieve resource efficiency. This can be defined as improving the efficiency – reducing the wastefulness – of the economy by achieving more efficiency in the production and consumption of economic outputs.

Traditionally, economic growth has been characterized by an initially high rate of natural resource consumption per capita, followed by a period of declining natural resource consumption past a certain rate of economic growth. However, with extreme population growth and the looming threat of global climate change, the global community has recognized the need to shift the economic growth trend towards more sustainable consumption and production – greater shared prosperity with less waste. To achieve resource efficiency and natural resource decoupling substantial shifts in technology, policies and behaviors are necessary. Reshaping traditional processes of natural resource consumption and realigning incentives is critical. This will require visionary leadership in government and business, and well-coordinated efforts across all segments of society.

Especially in economies with high levels of energy and water scarcity, resource efficiency gains can have substantial ripple effects on economic growth and employment over the medium to long term. The economic strength of the agriculture sector is a product of its ability to grow and sell a high volume of commodities and value-added products using those commodities. So, any measures that can reduce wastefulness (by reducing the amount of water and energy consumed, and by reducing the cost of waste management, for example) can also result in reduced input costs and boost profits. This increases productivity and profitability, while at the same time conserving natural resources and ensuring sustainability in production. Not only is sustainable consumption and production beneficial to business owners, governments also have an interest in seeing private sector profits reinvested into creating jobs and generating further economic growth.

Achieving resource efficiency in the agriculture and agro-processing sector requires a close examination of gaps and hotspots across the entire value chain. There are many inputs to examine: labor, seeds, machinery and equipment, pesticides and fertilizers, animal fodder as well as natural resources (including land, water and energy). In promoting sustainable consumption and production, governments may seek to increase the use of water efficiency technologies and techniques (such as soilless systems and drip irrigation) and sustainable energy sources (such as solar photovoltaic for water pumping or powering agro-processing facilities). The establishment of domestic input production industries (such as those which can make compost, fertilizers and pesticides), and sustainable animal feed production can also help reduce total costs of production.

Another way to increase resource efficiency is to find innovative solutions to reduce, reuse and recycle inputs, creating greater circularity. In terms of reduction, it is important to reduce use of harmful fertilizers and pesticides to the extent possible, in order to preserve soil and water quality. Food production can also be energy and water resource intensive, and can be instrumental in reducing the introduction of plastics into the municipal waste streams. Substantial reuse can be also be achieved through the use of natural chemicals for fertilizers. Agriculture losses, as well as food lost post-harvest, can be further reused and recycled into compost, biomass for energy production and organic fertilizers. Achieving these resource efficiency gains requires adequate data for analyzing the value chain, and strong research to innovation pathways that can identify and, if needed, create appropriate resource efficient technologies. There are also significant opportunities for business development and private sector investment in the area of resource efficiency.

Sustainable Development Goals: 7 (Affordable and Clean Energy), 9 (Industry, Innovation and Infrastructure), 12 (Sustainable Consumption and Production).

1.5 Climate Change Adaptation and Mitigation

Jordan's fifth national objective is to achieve climate change adaptation and mitigation, which is expressed as improving Jordan's resilience to the effects of climate change and decreasing the country's total greenhouse gas (GHG) emissions. This objective is consistent with the Paris climate change targets, which is the global community's plan to respond to the global climate crisis. Actions taken to address climate change adaptation and mitigation can also be found in Jordan's National Determined Contribution (NDC) to the Paris Agreement.

Transitioning to more sustainable agriculture and food production, and increasing investment in forestry, is one of the most impactful ways any country can adapt to and mitigate against climate change. Globally, the agriculture sector is the largest contributor to non-carbon dioxide (CO_2) GHG emissions (56%), while global Agriculture, Forestry and other Land Use activities account for 24% of total global GHG emissions.[18] These emissions primarily come from livestock production (32-40%) and release of GHGs from manure decomposition and synthetic fertilizers (roughly 27%).[19] For this reason, in addition to its health benefits, many studies suggest that individuals switch to a plant-based diet to fight against climate change.[20]

Despite the important role forests and trees play in mitigating against climate change, the coverage of forests as a proportion of the world's total land areas has steadily declined since 1990.[21] Forests and trees protect against climate change by absorbing or sequestering CO_2 from the air, an essential ecosystem service that ensures a stable climate. It is estimated that, under certain conditions, large-scale global efforts to restore forests could substantially slow the pace of climate change (sequestering up to 205 gigatons of CO_2 over the next 40-100 years), while also contributing to the restoration of ecosystems, which is essential to enhance the natural adaptive capacity.[22]

Sustainable Development Goals: 7 (Affordable and Clean Energy), 11 (Sustainable Cities and Communities), 13 (Climate Action).

[18] EPA. "Global Greenhouse Gas Emissions Data," n.d.
[19] Intergovernmental Panel on Climate Change, and Intergovernmental Panel on Climate Change. "Agriculture, Forestry and Other Land Use (AFOLU)." *In Climate Change 2014 Mitigation of Climate Change*, 811–922, 2015.
[20] BBC. "Plant-Based Diet Can Fight Climate Change - UN," 2019.
[21] FAO & UNEP. The State of the World's Forests, 2018.
[22] Scientific American. "Massive Forest Restoration Could Greatly Slow Global Warming," 2019.

2. Assessing Green Growth in Jordan's Agriculture Sector

2.1 Agriculture Sector Green Growth Situation Analysis

Natural Capital. Natural capital is a source of wealth that is often overlooked, undervalued, under-invested in and over-exploited. Jordan's agriculture and forestry sectors are responsible for a larger proportion of natural resource consumption and degradation than any other sector – particularly in terms of water and land resources. Regarding water, agricultural practices such as the overuse of fertilizers and pesticides have been shown to contribute to groundwater contamination in different areas of the country,[23] though few comprehensive analyses on this issue have been undertaken. This is due to the fact that farmers have little access to information regarding the long-term impacts of fertilizers and pesticides on the environment, and few alternatives in terms of techniques or technologies to reduce their use.[24]

Land degradation and desertification associated with agriculture are also challenges reducing the sector's potential contribution to economic growth. The full cost of environmental degradation from the agriculture sector is neither systematically measured, reflected in economic assessments nor reflected in Jordan's national accounts. However, a 2004 study by the World Bank estimated that the cost of overall environmental degradation was equal to roughly 3% of GDP annually (equal to roughly 205 million JD). The proportion of that cost attributed to land degradation and high soil salinity was estimated at 0.6 percent of GDP.[25] According to the government's National Strategy and Action Plan to Combat Desertification, the primary drivers of desertification in Jordan are land mismanagement (human factors) and climate change.[26]

Livestock overgrazing is one of the greatest challenges affecting land quantity and quality in Jordan. Grazing of livestock, particularly sheep, is an important source of livelihood for over 44,000 Jordanians[27], and a traditional and culturally significant activity of rural Jordanians (Bedouins). Currently, approximately 2.6% of Jordan's total land surface is considered cultivable (a reduction from 3.5% reported in 1988)[28], 12% of which can be used as farmland, and 80% of which is suitable for livestock grazing (mainly the Badia, or rangelands).[29] With livestock representing around 55% of agricultural production in Jordan[30], overgrazing and under-investment in protection and regeneration of the vulnerable Badia ecosystem are major contributors to land degradation. Decades of prolonged overgrazing have substantially reduced the value of the rangelands, as their carrying capacity has decreased by up to 70% since the 1970s.[31]

[23] Al-shibli, Fayha M, William A Maher, and Ross M Thompson. "The Need for a Quantitative Analysis of Risk and Reliability for Formulation of Water Budget in Jordan." *Jordan Journal of Earth and Environmental Sciences* 8, no. 2 (2017): 77–89.
[24] Al-zyoud, F.A. "Indiscriminate Use and Improper Application of Pesticides by Jordanian Vegetable and Fruit Farmers." Bull. Fac. Agric., Cairo Univ. 65, no. January 2014 (2015): 344–59.
[25] ICARD. "Land Degradation in Jordan – Review of Knowledge Resources OASIS Country Report 1," 2012.
[26] MoEnv. "The Aligned Action Plan National to Combat Desertification in Jordan," 2015.
[27] DOS. "Number of Employees in Livestock,"n.d.
[28] The World Bank. "Arable land (% of land area) – Jordan," 1988.
[29] MoAg. "Updated Rangeland Strategy for Jordan," 2013.
[30] MoAg. "Updated Rangeland Strategy for Jordan," 2013.
[31] MoEnv. "The Aligned Action Plan National to Combat Desertificati on in Jordan," 2015.

Land fragmentation, in which farming households possess several disconnected land plots spread over a wide area, is also a growing challenge for sustainable land use. This phenomenon is particularly common in countries with gaps in land use governance, such as unclear land tenure policies and weak land-use planning systems, which is the case in Jordan.[32] Fragmentation increases the complexity of governing land use and planning agricultural development. It also restricts the ability of farmers to achieve economies of scale, which further limits the profitability of their agricultural activities. This, in turn, can further compound the levels of environmental degradation and soil erosion, creating a vicious cycle.

Finally, forests contribute to environmental regeneration and provide a wide array of ecosystem services. Approximately 1% of Jordan is classified as forested, with natural forest constituting 0.44% of the total land area.[33] These forests provide important ecosystem services, such as soil conservation, watershed management, aesthetic and recreational value, biodiversity conservation, and carbon sequestration.[34] Forestation is increasingly considered a priority intervention in Jordan to promote rural livelihoods and eco-tourism. In addition, it is key to reducing erosion, protecting biodiversity, and promoting water quality. Efforts to develop Jordan's forests have been piecemeal, and deforestation continues to be a challenge. Strong leadership, enforcement of anti-deforestation laws, incentive structures, and inclusive planning and implementation of afforestation programs with local communities will be critical to increasing forest coverage in the future.

Sustainable Economic Growth. While overall production and value-added has increased in recent years, the disorganization of the market is seriously impeding the sector's ability to generate revenues and create jobs. Agricultural productivity is determined by a combination of three factors: quantities of inputs used for production, the quantity of agriculture commodities grown, and the prices at which those products are sold in the market.[35] On all counts, Jordan is exposed to technical and administrative challenges that result in lower productivity growth than other countries in the region. Signs are positive for a shift in the sector; in 2019, the MoAg reported a 63% growth in the sector's economic performance by implementing by-laws that diversified production and exports.[36] The decision to diversify and pursue export-led sector growth will require a sustainable approach - addressing natural resource scarcity, innovation, capital investment and labor market development in the same strategy.

Jordan is a net importer of food products, even though it exports quite a lot of agricultural products. The country imports 81% of its total food requirements, including 90% of its annual cereal demands and approximately 80% of its animal fodder requirements. So, for example, while sheep constituted more than 60% of the agricultural added value (1.6 billion JOD in absolute values[37,38]) in 2017, the cost of production is high due to reliance on foreign fodder sources. Fodder and other agricultural production could substantially be increased with investments in better technology and production techniques. The World Bank estimates that Jordan achieves only 50-60% percent of its fruit and vegetable export potential and only one-third of the potential to export livestock, worth a total of USD 805 million in export revenues lost annually.[39]

Agro-processing is a growth promoter that can be further expanded and leveraged to improve the economic impact of the sector. Agro-processing represents approximately 12.5% of the total economy's value-added,[40] 60% of which is agri-food production and 29% is clothing production. Value addition also represents a fifth of total agricultural exports, 13.6% of total agriculture sector employment.[41] Jordan excels in the production of certain fruits and vegetables that lend themselves to high value-added products. However, the pace of industrialization and the competitiveness of Jordanian products is low in international markets.

[32] MoEnv & UNDP. "Integrated Investment Framework for Sustainable Land Management in Jordan," 2015.
[33] FAO. "Global forest resource assessment country report – Jordan 2010," 2010.
[34] Jenkins, Michael, and Brian Schaap. "Forest Ecosystem Services - Background Analytical Study." In *United Nations Forum on Forests*, 41, 2018.
[35] Akroush, Samia Nadeem, Boubaker Dhehibi, and Aden Aw-Hassan. "Agricultural Growth Accounting and Total Factor Productivity in Jordan," *International Journal of Productivity Management and Assessment Technologies* 4, no. 1 (2016): 1–14.
[36] The Jordan Times. "Agriculture sector reaps 63% growth in 2019 — Minister," 2019.
[37] DOS. "Agricultural Statistical Yearbook 2017," 2017.
[38] The Global Economy. "Jordan: Agriculture Value Added," n.d.
[39] The World Bank. "The Role of Food and Agriculture for Job Creation and Poverty Reduction in Jordan and Lebanon," 2018.
[40] Figueroa, Jose Luis, Mai Mahmoud, and Hoda El-Enbaby. "The Role of Agriculture and Agro-Processing for Development in Jordan," 2018.
[41] IFPRI. "The Role of Agriculture and Agro-Processing for Development in Jordan," 2018.

The cost of doing business in the agriculture sector has been increasing, despite government subsidization and compensation programs such as water subsidies, export taxes, and import duties. While labor costs have decreased in recent years as more foreign laborers have entered the market, the economic impact of this labor investment is limited compared to the potential impact of investment in capital. However, farmers continue to invest in cheap labor because they are burdened by high input costs for seeds and fertilizers. Their inability to access 'high-tech', resource efficient equipment is hurting their ability to achieve economies of scale and maintain stable profits. The prevalence of "middle-men" in the marketing value chain in Jordan also means that many farmers do not receive equitable compensation for the products that are purchased in either domestic or export markets. The Agricultural Credit Corporation (ACC) exists to provide loans and other financial products to farmers, in order to improve their ability to invest in the growth and sustainability of their businesses. In 2019, the ACC disbursed JD27 million in loans to over 8,800 farmers, more than a quarter of which were granted to women, with many having been used to invest in environmentally friendly on-farm technologies.[42]

While reforms were made in the 2016-2018 period, Jordanian farmers' access to finance is still one of the major challenges to sector growth. In particular, farmer cooperatives have struggled to manage the financial burdens associated with sectoral activities, and lack of cooperation has limited the sector's ability to achieve economies of scale in key sub-sectors. The Jordan Cooperatives Corporation (JCC) and farmers unions can both improve the employment conditions and help maximize sectoral efficiency and productivity. Efforts are underway by development partners to strengthen the governance capacity of cooperatives and unions.

As a result of the lack of investment in quality assurance and quality control, the quality of Jordan's agricultural products is considered low, particularly its fruit and vegetables. This is, in part, due to the lack of modern infrastructure and procedures for sorting, packing, scaling, and transport. Currently there are 12 operational sorting, packing, and scaling facilities, most of which do not meet the standards required to ensure high quality products are sent to market. In addition to the insufficient number of facilities, the ones that do exist tend to be located far from markets and they are dedicated for certain crops primarily produced by large farms. All exported food products receive inspection by MoAg and compulsory health certificates, but quality standards are inconsistent and largely dependent on the buyer's requirements. These facilities are not fully automated and many of them are outdated or in disrepair.[43]

In terms of export policies, Jordan's agricultural trade policymaking process is an additional constraint on external market development. Although the government has made strides in achieving trade liberalization in the recent decade[44], its ability to implement its National Export Strategy (2014-2019)[45] has been limited by institutional disorganization, lack of technical skills, and low investment in innovation that must be addressed for long-term success. These gaps are closely linked to the scattered governance of the sector, with agricultural

[42] The Jordan Times. "Credit corporation loans to agriculture sector garner mixed responses from farmers," 2020.
[43] JIC. "A Preliminary Economic Feasibility Study for a Project Center for Processing, Grading and Packing Vegetables and Fruits," 2017.
[44] FAO & European Bank. "Jordan - Water along the Food Chain: An Analytical Brief of Selected Food Chains," 2015.
[45] FAO and European Bank. "Jordan - Water along the Food Chain: An Analytical Brief of Selected Food Chains," 2015.

trade and export policy determined by decision makers in various institutions and across levels of influence. These include the Ministry of Industry and Trade and Supply (MITS), the Jordan Investment Commission (JIC), the Jordan Enterprise Development Corporation (JEDCO), the Jordan Food and Drug Administration (JFDA), in addition to Prime Ministry (PM) and MoAg. Structured dialogue and feedback loops between public and private sectors are infrequent and inconsistent. Incorporation of private sector investors and associations in the decision-making process is a critical enabling condition for market development.

Social Development and Poverty Reduction. Jordan's Agriculture sector has substantial poverty reduction potential; however, this is limited by several factors. Poverty rates are higher in Jordan's rural areas, with 17% of rural Jordanians living below the poverty line, compared to a national average of 14.4%.[46] While 20-25% of families depend on agriculture sector, and with the sector employing many women and refugees, 40% of agriculture sector households are considered poor. This suggests that rural development and agriculture sector development are strongly related. As such, there are many ways in which the government tries to supplement the incomes of rural families by promoting their participation in the agriculture sector. MoAg, for example, provides grants to supplement incomes and encourage home gardening. Agriculture Risk Management Fund (ARFM) was established to protect poor farmers from climate or weather-related losses. In the 2016-17 winter, ARFM provided 1.2 mil JOD to farmers as compensation for flood-driven losses.[47] Water subsidies make it cost-effective for farmers to grow crops as way to preserve livelihoods. The stagnation of investment in the sector suggests that, despite substantial government support, subsidization has created externalities that need to be unpacked and addressed for real social development and poverty reduction to happen.

The agriculture sector labor market is, in many ways, hurting the ability for the government to achieve social development through rural development programs. For example, while employment of refugees is now legally permitted in the agriculture sector, recent studies point to poor working conditions, extremely low wages, lack of protection for children and high geographic variability.[48] Refugees now make up an estimated 70% of the total agriculture sector labor force in Jordan, but investment in their labor, while a boost to their overall employment statistics, has not trickled up generating wealth or reducing instances of poverty in the economy.[49] Informality still has an important role in this situation. According to a 2018 survey conducted by the International Labour Organization (ILO), informal labor brokers (known as "Shaweesh") were used by 48% of surveyed refugee agriculture sector workers, and 82% of agriculture employers used brokers to find workers.[51]

Employment conditions in the agriculture sector also do little to support social development or poverty reduction for women or youth, which is why many are turning away from the sector. UN Women estimates that 52% of rural Jordanian women work in the agriculture sector, mostly as farm laborers, representing 21% of the formal agricultural labor force.[52] However, the majority of women who engage in paid agricultural labor (rather than home-based agriculture) tend to do so informally and seasonally, meaning they do not receive a stable salary or enjoy the protections that might come with a legal contract, such as safe working conditions and access to social security and health insurance.[51] Gendered constraints also prevent female farmers from having equal access, control and ownership of agricultural resources; only a small minority of women own agricultural lands in Jordan, most of which does not exceed an area of two hectares.[53]

[46] The World Bank. "The Role of Food and Agriculture for Job Creation and Poverty Reduction in Jordan and Lebanon," 2018.
[47] The Jordan Times. "Severe weather causes 'over JD1 million' in agricultural losses — farmers," 2018.
[48] ILO. "Decent Work and the Agriculture Sector in Jordan," 2018.
[49] IFPRI. "The Role of Agriculture and Agro-Processing for Development in Jordan," 2018.
[50] ILO. "Decent Work and the Agriculture Sector in Jordan," 2018.
[51] UN women and REACH. "Women's Participation in the Agricultural Sector, Rural Institutions and Community Life," 2018.
[52] UN women and REACH. "Women's Participation in the Agricultural Sector, Rural Institutions and Community Life," 2018.
[53] Institute for Women's Studies in the Arab World. Jordan Gender Profile.

UNICEF estimates that 39% of youth in Jordan are not involved in education, employment or training resulting in one of the world's highest youth unemployment rates.[54] However, youth are not interested in working in the sector, viewing it as a low-skilled and low-income career path.[55] While access to education is not a major challenge in Jordan, access to a high-quality and relevant education that prepares youth to be the workforce of the future is a challenge. In terms of higher education and adult skills training, outcomes and job placement are also low relative to their participation rates, affecting the country's overall economic strength. The 2018 Global Competitiveness Report by the World Economic Forum shows Jordan dropping in terms of overall competitiveness in large part due to gaps in "ease of finding skilled employees, extent of staff training and quality of vocational training".[56] Indeed, while roughly 900 agricultural engineers graduate from Jordanian universities annually (70% of whom are female), very few of them find employment in Jordan despite the relatively large gap in agriculture labor supply and demand.[57]

Jordan is at risk of experiencing high levels of food poverty under the current consumption and production patterns, the bulk of which would impact those at the bottom of the pyramid. Food inflation - defined as the relative consumer price index (CPI) of food and beverages to the total CPI - spikes occurred in 2009 (post the global financial crisis) and 2011 (post the Arab spring and the Syrian Civil War), with a peak recorded in 2014 (post the interruption of trade routes and closure of land borders with Iraq and Syria) as depicted in Figure 4[58]. A study conducted in 2014 showed that Jordan spent more than 13% of export revenues and remittances on imports, which indicates a severe food security risk[59]. Similarly, research in 2016 revealed a substantial increase in food insecurity between 2010 and 2013, with 5.7% of Jordanian households found to be vulnerable to food insecurity[60]. The country produces only 14% of its caloric needs per capita, which has resulted in Jordan becoming the seventh-most vulnerable nation to the impact of rising food prices. The country imported roughly 2.4B JOD in 2017[61,62] in food to make up for demand, which has peaked as population has been steadily growing at an average of 2.3 percent annually over a decade of regional political crisis. This risk can also be mitigated against through better market organization and more effective investment in rural development.

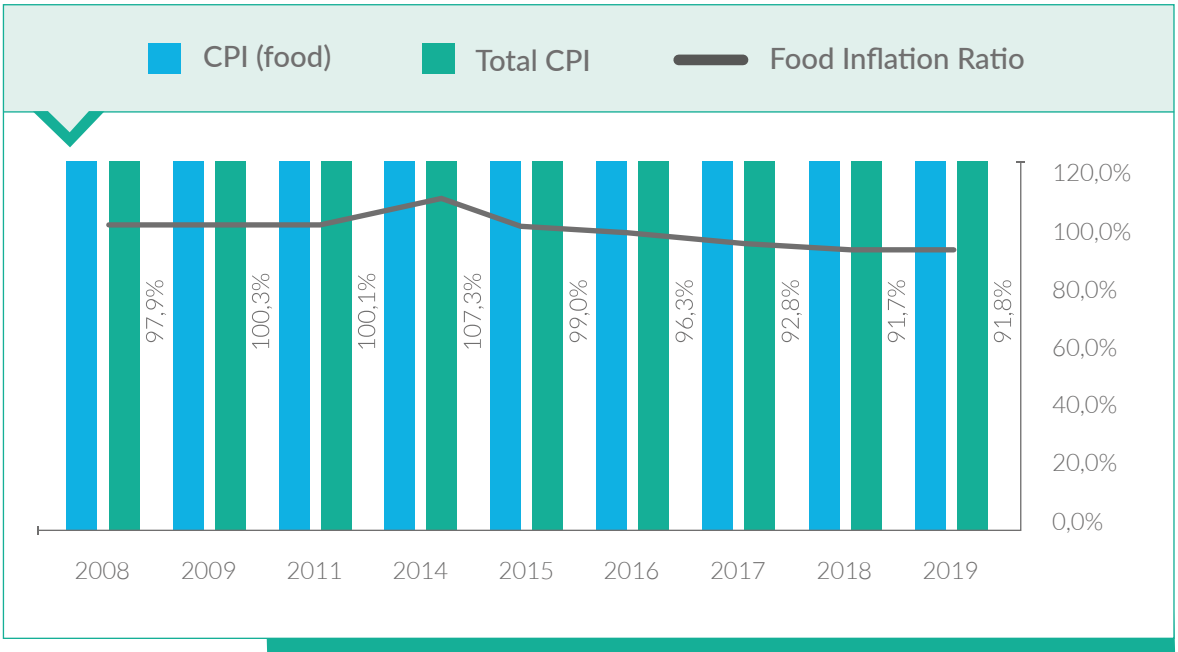


FIGURE 4
Food inflation ratio of Jordan throughout 2008-2019.

[54] UNICEF. "Opportunities for Youth in Jordan," 2019.
[55] Zecca, Francesco. "Challenges and Potential of Future Agricultural Development in Jordan : Role of Education and Entrepreneurship." *Academic Journal of Interdisciplinary Studies*, 2016, 10–19.
[56] The Jordan Times. "Jordan falls two spots in Global Competitiveness Report," 2018.
[57] Jordan Agriculture Engineers Association estimate in The Jordan Times. "Agricultural engineers, workers to receive training on Jordan Valley farms" 2016
[58] DOS. "Figure 6: Food Inflation ratio over the period between 2008-2019", 2019.
[59] Woertz, Eckart, Eduard Soler, and Oriol Farrés. "The Impact of Food Price Volatility and Food Inflation on Southern and Eastern Mediterranean Countries." *Economics*, 2014.
[60] DOS & WFP. "The State of Food Security in Jordan (2013–2014)," 2016
[61] DOS. "Monthly Report for External Trade," n.d.
[62] DOS. "External Trade Yearbook 2018," 2018.

Resource Efficiency. Wastage in the agriculture sector can be found at all points in the consumption and production of agricultural products in Jordan. Regarding water, although measures have been taken to increase irrigation efficiency in Jordan, water consumption is especially pronounced compared to the economic value that is generated from its use. The agriculture sector consumes 52%[62] of Jordan's water resources, yet the sector's contribution to GDP is only 4% (see Figure 5 below).[63] If allocation of water resources to agriculture were considered an investment of natural capital, the economic return on its investment is low. This situation has far-reaching development implications, considering Jordan is one of the most water scarce countries in the world, with a water deficit reaching more than 408 million cubic meters MCM) per year in 2017. [64]

Wastewater reuse is gaining support among rural communities and farmers, despite initial reservations, but more effort is needed to scale up these types of projects and the awareness programs that enable their implementation. Wastewater treatment plants, such as the As-Samra wastewater treatment plant have reuse components to redirect treated wastewater toward agricultural applications, and substantial investments have been made to allow transport and reuse of the treated wastewater for agricultural purposes, among others. Wastewater recycling, food import substitution and water efficiency policies could support the reduction of agriculture sector water consumption by up to 30%.[66] Although drip irrigation is common in the Jordan Valley, introduction of water efficient crop production such as the use of aquaponics or hydroponics and other soilless agriculture technologies, in addition to rehabilitation of irrigation networks, are also needed. Further development of rainwater harvesting efforts can also augment supply, especially for those in remote areas who are often the most vulnerable to water scarcity.

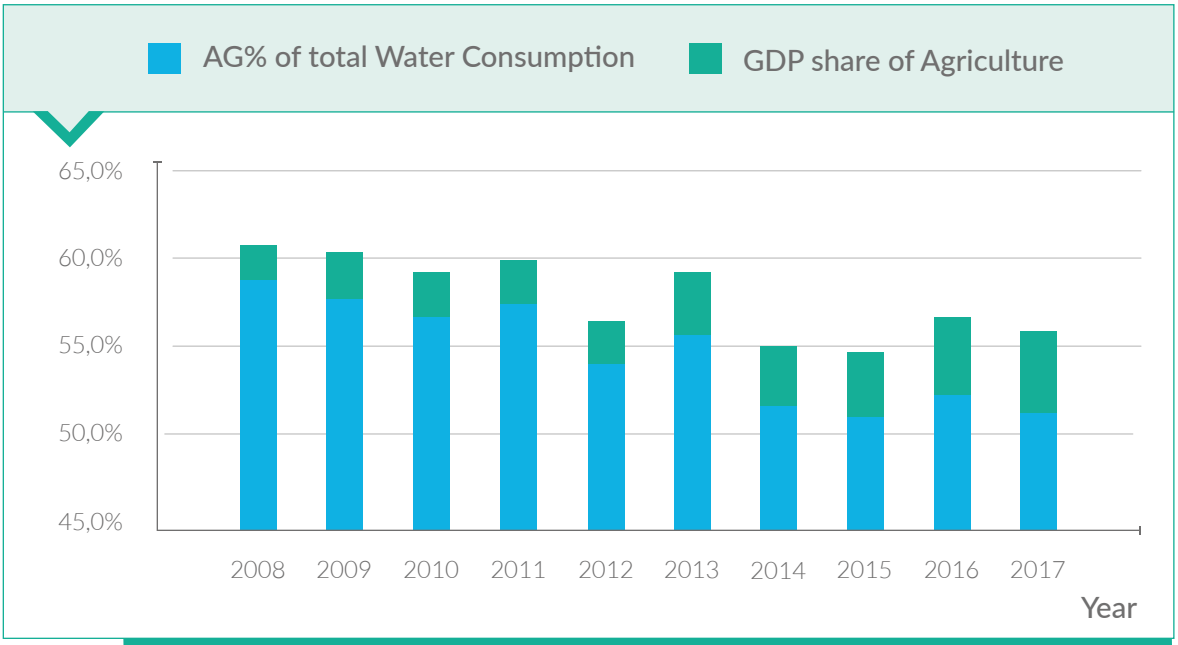


FIGURE 5
Agriculture sector water consumption vs. GDP contribution for the period (2008-2017) – (Ministry of Water and Irrigation (MWI), 2017) & (Department of Statistics (DOS), 2017).

[63] MWI. "Water Sector Facts and Figures 2017," 2017.
[64] MOPIC. "Jordan Economic Growth Plan (2018-2022)," 2018.
[65] MWI. "Water Reallocation Policy 2016," 2016.
[66] WANA Institute. "Decoupling National Water Needs For National Water Supplies: Insights and Potential for Countries in the Jordan Basin," 2017.

Waste management in the agriculture sector is an opportunity to achieve cost savings while increasing profits. Jordan's agriculture sector produces several sources of organic waste that can be re-used as inputs to circular economy-oriented solutions. Waste from slaughterhouses, fruit and vegetable markets, agro-processing facilities, animal manure produced on farms, olive mills and potentially others can be digested, and the biogas used for energy (such is the case, for example, at the Rusaifeh landfill near Amman). The biogas can also be used on-site to offset consumption of energy from the national grid. Some forms of organic content, such as manure from cow and chicken farms, can also be used in the production of farming inputs like compost, organic fertilizer and soil improvers. This element could have a massive impact on the sector – potentially reducing the cost of inputs for production which has been highlighted as a major barrier to investment in agriculture, especially for organic farmers.[67]

Food waste due to post-harvest losses is a source of inefficiency that the agriculture sector can address through upstream activities. JIC estimates that the sector experienced post-harvest losses of between 20 and 40% in 2017.[68] This direct loss of potential profits is due to the lack of necessary infrastructure to handle, store and transport cultivated products from farms to markets. Cold chain is an essential part of any food security or agricultural development strategy, yet the rate of refrigeration and the development of the cold chain in Jordan has been slow compared to regional economies such as Egypt and Lebanon, and is well-below global averages.[69] One way to address this challenge would be to enable greater access to cold chain technologies on farms and in transit facilities (such as trucks or storage houses) through cold-chain audits and subsidization of investments.

In general, resource efficiency is critical to the sustainability of the sector and has a close relationship with the socio-economic impact of the sector. Jordan's National Employment Strategy 2011-2020 notes that sectors such as the agriculture sector, that rely on the consumption of water and energy, must become more resource efficient if they are to sustain their poverty-reducing potential.[70]

Climate Change Adaptation and Mitigation. Global climate change has already impacted Jordan, and this is expected to continue well into the future. Jordan has experienced increased temperatures and rainfall variability, which has placed further strain on water supply, and therefore, the agriculture sector. The forthcoming National Adaptation Plan suggests that in the coming decades, overall average temperatures will increase between 2.1-4.0 degrees Celsius (by 2070-2100), accompanied by more heat waves. These projections also suggest summers will be warmer, autumn and winter will be drier, and droughts will be more common and last for longer periods of time.[71] All these trends will have impacts on agricultural productivity and water scarcity, with especially severe impacts in dry agro-ecological zones, including the Jordan valley where the majority of the country's agricultural production takes place. This will make it more difficult for farmers to grow water-intensive crops, such as bananas and citrus, and more expensive for the government to continue subsidizing water for agricultural purposes.

The agriculture sector's ability to adapt to climate change will determine its future growth potential. Projected climate scenarios signal that Jordan is at a crossroads in terms of its agricultural productivity. Much more attention and coordination are needed to support the roll-out of key technologies to promote 'climate smart' agriculture, changed cropping cycles, drought and heat-resistant varieties.[72] Though fiscal pressures are looming, investment in infrastructure such as terracing, water harvesting and storage, and early warning systems will have substantial second level impact on productivity and sustainability. For this reason, the government and the private sector must be well-aligned in their production and export approaches. The government can also support farmers directly by supporting access to technologies and infrastructure, as well as capacity building and awareness raising on the issue of climate change through research and extension services.

While mitigation actions in the agriculture sector may have little impact on Jordan's overall emissions profile, afforestation and reforestation are win-win approaches for both the climate and natural resources that should be scaled up. Jordan's GHG emissions profile shows that agriculture, forestry and land-use category only accounts for 4% of the country's overall footprint.[73] Forest resources cover roughly 1% of the total land mass, with agricultural activities often integrated, making it difficult to control grazing, logging and urbanization. Enforcement of anti-logging and vandalization laws has increased, but much more can be done to involve local communities and stakeholders, including private sector, into the management of forested areas. Interlinking the forest development and watershed management approaches may also present an attractive policy approach for government to consider.

[67] JIC. "A pre-feasibility study for Producing Organic Fertilizers Project in Ajloun Governorate," 2017.
[68] JIC. "A Preliminary Economic Feasibility Study for a Project Center for Processing, Grading and Packing Vegetables and Fruits," 2017.
[69] FAO. "Developing the Cold Chain for Agriculture in the Near East and North Africa," 2012.
[70] MOPIC. "Jordan's National Employment Strategy 2011 - 2020," 2011.
[71] National Adaptation Plan to Climate Change in Jordan (forthcoming).
[72] All of these solutions are currently being researched within Jordanian academic and research institutions, including at the National Agriculture Research Center
[73] ICF International&USAID. "Greenhouse Gas Emissions in Jordan," 2016.

2.2 Current Agriculture Sector Strategic Priorities

Jordan Vision 2025. This document is the country's primary economic and social development strategy, addressing the primary economic, social and governance challenges affecting Jordan's ability to transform into a more developed economy. While environment and climate change are not at the center of the Jordan Vision, the agriculture sector description laid out in the Vision does integrate many green economy concepts. The agriculture sector is also recognized as a key enabler of rural development and poverty reduction because the sector employs many rural citizens in cultivation and production. The topics of forests and biodiversity are recognized as adjacent areas of intervention, but measures have not been included to mainstream environmental and ecosystems-based approaches in sector-level solutions. Key objectives of the **targeted scenario by 2025** include:

- Encourage private sector participation in the purchase of foodstuff.
- Improve Jordanian negotiation and procurement skills in global markets.
- Reduce the risk of supply and price shocks.
- Ensure the highest level of competition in the local market.
- Transition towards more sustainable, efficient and productive local agricultural production.
- Maintain the sustainability of agricultural resources and biodiversity.
- Ensure a healthy and safe agricultural production.
- Expand support programs for exiting farmers to maximize the productivity and efficiency of water for current farms.

National Agriculture Sector Development Strategy (NASDS) 2016-2025. The NASDS is the MoAg's primary strategy to achieve greater sector productivity, efficiency and economic impact. Many of the environmental, social and economic priorities outlined there are well-aligned to the green growth approach. Specific objectives of the strategy include:

- Increase agricultural productivity.
- Achieve efficient use of irrigation water.
- Increase the use of technology on farms.
- Increase cooperation between the government sector and the private sector.
- Competitive agricultural marketing linking production to demand for internal and external markets.
- Internationally accredited quality and accreditation systems.
- Production and marketing of agricultural products (linked first to the Gulf market demand).
- A high rate of self-reliance in food security.
- High integration with other economic sectors.
- A growing ability to cope with risks.
- A fair distribution of agricultural development returns.

See Annex I for a detailed analysis of the relationship between this Action Plan and the NASDS.

Jordan's existing national plans, strategies and policy documents add a further level of specificity to its priorities, many of which are linked to green growth (see Table 2, below).

TABLE 2
Green Growth Priorities found in Existing National Documents

Relevant strategies for Agriculture Sector	Green Growth Dimension				
	Enchanced Natural Capital	Sustainable Economic Growth	Social Development & Poverty Reduction	Resource Efficiency	Climate Change Adaptation & Mitigation
National Strategy and Action Plan to Combat Desertification (MoEnv)	x				x
Integrated Investment Framework for Sustainable Land Management in Jordan (MoEnv)	x				x
National Biodiversity Strategy and Action Plan (MoEnv)	x				
Water Reallocation Policy (MWI)	x				
Updated Rangeland Strategy for Jordan (MoAg)	x	x	x		
National Agriculture Sector Development Strategy (2016-2025)		x	x	x	x
Jordan Economic Growth Plan (Ministry of Planning and International Cooperation (MOPIC))		x			
Jordan: Growth and Opportunity (MOPIC/PM)		x			
National Employment Strategy (Ministry of Labor)			x		
Jordan Response Plan for the Syrian Crisis (MOPIC)			x		
National Adaptation Plan (forthcoming) (MoEnv)			x		
National Strategy and Action Plan for Sustainable Consumption and Production (MoEnv)				x	
Jordan Technology Needs Assessment for Climate Change – Technology Action Plans (MoEnv)				x	x
National Climate Change Policy (MoEnv)					x
Intended NDC and NDC Action Plan (MoEnv)					x
Climate Change Policy for a Resilient Water Sector (MWI)					x

2.3 Agriculture Sector Stakeholders

MoAg is the lead government institution responsible for strategic planning and policy development for Jordan's agriculture sector. MoAg is involved in all aspects of the agriculture sector, from economic planning, research, extension services (guidance) and policy development, to marketing, forestry and rangelands management, animal production, plant production, natural resource protection and human resource development. To implement its sector strategy and objectives, MoAg works with other ministries, private sector associations and civil society actors. Other key sector stakeholder institutions responsible for guiding and implementing agriculture sector priorities include:

Key Stakeholders

- Agricultural Credit Corporation
- Agricultural Engineers Association
- Agriculture Risk Management Fund
- Jordan Cooperatives Corporation
- Jordan Enterprise Development Corporation
- Jordan Exporters and Producers Association
- Jordan Farmers Union (JFU)
- Jordan Investment Commission
- Jordan Organic Farming Association
- Jordan Standards and Metrology Organization (JSMO)
- Jordan Valley Authority (JVA)
- Ministry of Environment (MoEnv)
- Ministry of Finance (MoF)
- Ministry of Industry and Trade and Supply
- Ministry of Labor
- Ministry of Local Administration (MOLA)
- Ministry of Planning and International Cooperation
- Ministry of Transportation (MoT)
- Ministry of Water and Irrigation
- National Agricultural Research Center
- National Center for Research and Development-Badia Research Programme
- Royal Society for the Conservation of Nature (RSCN)
- Water Authority of Jordan

Key Sector Donors and Development Partners

- Adaptation Fund
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
- European Investment Bank (EIB)
- European Union (EU)
- International Fund for Agricultural Development (IFAD)
- International Center for Agricultural Research in the Dry Areas (ICARDA)
- International Labor Organization (ILO)
- Japan International Cooperation Agency (JICA)
- Netherlands Embassy
- Swedish International Development Cooperation (SIDA)
- United Nations Development Programme (UNDP)
- UN - Food and Agriculture Organization (UN-FAO)
- United Nations Industrial Development Organization (UNIDO)
- United Nations Entity for Gender Equality and the Empowerment of Women (UNWOMEN)
- United States Department of Agriculture (USDA)
- World Bank
- World Food Programme (WFP)

3. Agriculture Sector Sub-Objectives and Action Selection

3.1 Consultation and Formulation Process

Sustainable agricultural production and rural development are top priorities enshrined in the ***National Agriculture Sector Development Strategy 2016-2025***, as well as the Jordan Vision 2025. Further operationalizing the five national green growth objectives described in Chapter 1 and assessed in Chapter 2, agriculture sector sub-objectives linked to these top national agendas were developed for each national objective. These sub-objectives serve as a sustainable agricultural development agenda which can be continually developed by national stakeholders.

Close coordination and collaborations with the MoAg, NARC and MoEnv ensured alignment with sector priorities. Special emphasis was also given to establishing linkages with the country's cross-cutting environment and socio-economic strategies and plans such as the National Biodiversity Strategy and Action Plan and the Strategy and Action Plan to Combat Desertification. Where specific green growth concepts were not prominently mainstreamed into policies and strategies, global green growth best practices were incorporated into the objective and action levels.

The five national green growth objectives are translated into 17 sector sub-objectives for Jordan's agriculture sector as detailed in Table 3.

National Green Growth Objective	Agriculture Sector Green Growth Sub-Objectives
Enhanced Natural Capital	a. Reduce air, soil and water pollution resulting from agriculture and food production processes; b. Increase the area of degraded lands for restoration in the rangelands/Badia ecosystem; c. Protect the area of forested land and increase the rate of afforestation and reforestation.
Sustainable Economic Growth	a. Increase transparency and the use of evidence-informed decision making by public and private sector agriculture stakeholders; b. Improve the quantity and quality of agricultural product such that it is in line with international standards; c. Enhance the quantity and quality of public-private-civil society exchange regarding agriculture sector development; d. Increase public and private investment in technology and systems for modernizing and greening on- and near-farm agricultural processes.
Social Development and Poverty Reduction	a. Improve the skills and capacity of farmers, rural communities, youth and women to undertake sustainable agriculture; b. Increase remunerative and socially inclusive rural employment by supporting vulnerable members of society to improve ecosystem integrity and create sustainable income generating opportunities; c. Reduce the impact of environmental and economic shocks on the most vulnerable members of society (particularly farmers, women, youth, and rural communities).
Resource Efficiency	a. Increase the practice of water re-use of treated wastewater for agricultural purposes; b. Increase the amount of agriculture sector's waste biomass used as a resource (compost, energy, and food/fodder value-add); c. Increase use of resource efficient technology to reduce consumption and cost of water, energy, and waste management on farms and in agro-processing.
Climate Change Adaptation and Mitigation	a. Increase use of high-yield, drought and salinity-resistant plant varieties; b. Develop and implement policy and fiscal tools that encourage the take-up of adaptive techniques and technologies; c. Introduce the concept of climate smart agriculture on farms; d. Increase carbon sequestration capacity of Jordan's land and forest.

Climate Action Priority. Climate action – policies and investments which lead to climate change adaptation and mitigation – are key priorities for the Government of Jordan. Actions which are noted to contribute to the strategic objective of "Climate Change Adaptation and Mitigation" represent sectoral priorities that can also be found in the NDC Action Plan and/or the ***National Adaptation Plan***[74]. These documents, along with the GG-NAP, guide the MoEnv in planning and implementing its international climate change commitments, for which it aims to achieve 14% overall GHG emissions reductions by 2030, including 1.5% unconditional reduction against the baseline, with a 12.5% additional reduction target being conditional upon receiving financial and technical support from international donors and development partners.


بسم الله الرحمن الرحيم

Hashemite Kingdom of Jordan

Intended Nationally Determined Contribution (INDC)[1]

Jordan's INDC Summary

Jordan nationally determines to reduce its greenhouse gas emissions by a bulk of 14 % until 2030. This contribution of GHGs reduction will be unconditionally fulfilled at, maximally, 1.5 % by the Country's own means compared to a business as usual scenario level.

However, Jordan, conditionally and subject to availability of international financial aid and support to means of implementation, commits to reduce its GHGs emissions by additional, at least, 12.5 % by 2030.

The outcome targets above are accompanied by a diverse combination of numerous GHGs cut-oriented actions in all involved sectors of emissions in addition to the adaptation actions in targeted sectors. These actions (policies, strategies, legislations, measures, etc) are articulated in this document. The methodological approaches underlying Jordan's INDC are included in this communication as well.

14% | GHG emissions reduction by 2030

1.5% unconditional 12.5% conditional

[74] These priorities have been developed for MoEnv with the support of *NDC* Partnership and *GIZ* programs in Jordan.

3.2 Translating Green Growth Priorities into Actions

Taking into account the priorities of stakeholders, the gap analysis performed and the strategic planning exercises conducted, a prioritized list of investments and enabling actions were identified and validated by the MoEnv, MoAg, NARC, and Global Green Growth Institute (GGGI). Ideas were solicited through an open call for ideas with key government and non-government stakeholders. Action proposals were received and reviewed using a multi-level screening tool, from which priority interventions (policies, programs and investments) were selected and presented at a national preliminary validation workshop in December 2018. The findings of this workshop revealed the preference by stakeholders to prioritize those with:

- Strong links to national green growth objectives;
- High levels of innovation or novelty in concept;
- Likelihood to attract private sector investment or develop the private market.

Bilateral and small-group consultations were conducted through 2019 to prioritize and formulate the actions proposed by sector stakeholders. This process included the assessment of feasibility, risks, and alignment with government priorities as per the feedback received in 2018, which improved the depth of analysis, input from private sector actors and local technical experts. The zero draft of the action plan was reviewed by an ad-hoc Transport Sector Green Growth Review Committee, hosted by the MoT. Endorsement was received by sector leadership in the MoT, and approval was received by the Cabinet of Ministers in early 2020.

For the purpose of this action plan, actions are presented in three ways: as ***enabling actions***, as an ***investment,*** and as a combination of the two.

- ***Enabling Actions.*** These are considered to be any actions that will enable stakeholders (government and/or others) to be more prepared for future green growth policy or investment implementation. They are policy, strategy, research, and capacity building-oriented in nature. They can be implemented through a mixture of donor and government support. Donors would typically support implementation on a grant basis through technical assistance funds. Each action description contains the detailed rationale and strategic orientation which will allow Action Leads to develop funding proposals for these actions as priority green growth programs.

- ***Investment Actions.*** These are priority investment projects that support the achievement of national green growth objectives. Investments must be proven feasible from a technical, financial, and environmental standpoint. As such, they require proof of concept, a business model showing that an attractive return on investment is possible.

For enabling actions that do not lead to an investment, the estimated budget and status of financing of the action are noted in the action descriptions in Chapter 5. In these cases, the "No" box is checked under the "Action Leads to Investment" section of the action description. It is important to note that some technical assistance actions may lead to investment. However, for the purposes of this action plan, all actions that do not include feasibility analysis for a specific project or investment are assumed to not lead to an investment.

Estimated Budget for this Action	
Financing Secured	☐ Yes ☐ No
Potential Source of Funding	
Action Leads to Investment	☐ Yes ☐ No ☐ This action is an Investment opportunity
Estimated Investment Size	

For many green growth investments, limited feasibility analysis is available. In these cases, the action includes the development of the required analysis (feasibility studies, technical assistance, etc.) directly related to a potential or known investment opportunity. The "Estimated Budget for this Action" is noted in the description table, and the "Yes" box is checked in the "Action Leads to Investment." In the case of investment opportunities that have feasibility analysis completed and are considered ready for investment, the box "This action is an investment opportunity" is checked. In both cases an estimated budget for the implementation of the project/investment is given, based on the available information (such as a feasibility study, consultation with project designers, or best estimation).

Table 4 shows the types of actions found in the GG-NAP 2021-2025.

TABLE 4
Types of actions found in the GG-NAP 2021-2025

Action Type	Description of Activities to be Implemented
Enabling Action	**Any action that will enable stakeholders** (government and/or others) to be more prepared for future green growth policy or investment implementation. Activities, outputs, and milestones might include: ▪ Policy analysis, recommendations, and reform ▪ Capacity building programs, public campaigns that increase awareness among a set of key stakeholders ▪ Knowledge exchange and learning ▪ Reforms to processes, procedures, and institutional setup ▪ Technical studies and analysis
Investments	**Any action that will lead to investment in a specific project** that will support the achievement of one or more of the sector green growth sub-objectives. **For demonstration or pilot projects**, activities, outputs, and milestones might include: ▪ Investment analysis and preparation activities ▪ Clarify the proof of concept (technical and financial aspects) of implementation of green growth projects ▪ Reform of specific policies or regulations required to attract investment ▪ Develop service models and business plans ▪ Inform replication or scale up **Investment-ready projects** are considered ready for implementation between 2021 and 2025 based on available feasibility analysis.

Action Priority Level. Actions that were considered low priority for green growth were not included in the action plan, and action descriptions were not developed. From the numerous ideas received, a limited number of detailed action descriptions were prepared and assessed according to the criteria below. Sector review committees and green growth focal points at the relevant line ministries were asked to evaluate and validate the level of priority, and this is noted in each action form presented in Section 4.4.

Table 5 shows the prioritization criteria for GG-NAP 2021-2025.

TABLE 5
Prioritization criteria for GG-NAP 2021-2025

Priority Level	Description
Low	Low-priority actions are those which do not meet the adjusted criteria after the Preliminary Validation Workshop, meaning they: ▪ Lack clear and substantial links to national green growth objectives ▪ Lack innovation and do not demonstrate added value to existing sector objectives, as outlined in national/sectoral policy documents ▪ Cannot be reasonably implemented given the available resources or capacity at the sector level in the 2021-2025 period ***Low-priority actions have not been included in this action plan.***
Medium	Action which: ▪ Positively contributes to at least one of the national green growth objectives and sector sub-objectives ▪ Adds value to existing sector objectives (as outlined in national/sectoral policy documents)
High	Action which meets all the "Medium" criteria, plus: ▪ Encourages changes to the prevailing 'business as usual', triggering long-term, sustainable green growth transformation ▪ Impacts a large geographical area or segment of the population
Very High	Action which meets all the "High" criteria, plus: ▪ Considered a key milestone for future implementation of green growth actions, i.e., enabling actions that lead to improved and quantifiable green growth policies and investments ▪ Has strong private sector orientation, interest and/or ownership ▪ Resources have been identified for implementation (public, private, donor)

4. Implementation Arrangements

4.1 Action Implementation

Green Growth Implementation Principles. Successful implementation of this plan will require sector-level policy and institutional reform measures. The goal of these measures is to achieve:

- Greater strategic alignment and coherence among existing plans and strategies;
- Improved coordination between government institutions and stakeholders;
- More meaningful and frequent engagement of private sector, Non-Governmental Organizations (NGOs) and other non-government actors;
- Stronger investment and strategic planning systems and processes, leading to stronger return on investments made in national development and economic growth;
- Technical capacity development within government institutions.

Roles and Responsibilities. Green growth is a unique development approach that will require a high level of collaboration between national stakeholders, which has been called out as both a key challenge and opportunity in the NGGP. MoAg is the leading institution responsible for overseeing the implementation of all policies and strategies for the agriculture sector, but most of the actions in this action plan require joint preparation and implementation across institutions, stakeholders and sectors. The private sector, civil society actors and government agencies – such as the Ministry of Water and JVA, JCC, NARC, MoEnv and many more – are included as action implementation leads and support. Donors, development agencies and local NGOs are needed to provide financial support, technical expertise and knowledge of local needs and context.

Table 6 shows the roles and responsibilities of various stakeholders for green growth implementation in Jordan.

TABLE 6
Roles and Responsibilities of Various Stakeholders for Green Growth Implementation in Jordan

Stakeholder	Roles and Responsibilities
Action Lead	▪ Ensuring the action is successfully implemented within the planned time frame. This may include additional preparatory actions such as further consultations, resource mobilization (identifying potential donors, writing funding proposals, preparing project documents), coordinating stakeholders, and facilitating implementation (disbursing funding, etc.). ▪ Provide progress status reports as needed to the relevant focal ministry for M&E purposes. ▪ For investments, the Action Lead is the project owner.
Action Support	▪ Support the Action Lead by providing technical feedback, in-kind or financial support, drafting and ideation support, and other collaborations during all phases of action planning and implementation.
Sector Green Growth Focal Points at MoAg	Action Implementation ▪ Serve as focal point for communications and reporting on Sector Action Plan progress with MoEnv. ▪ Support action implementation by supporting Action Leads with resource mobilization, coordination, data collection, etc. ▪ Ensure the policy/regulatory environment supports action implementation (with donor support if required). Mainstreaming ▪ Support mainstreaming activities and approaches that support green growth implementation into sector-level policies and investments. ▪ Serve as technical advisor to line ministry leadership on an ad-hoc basis (especially Secretary General sitting on the Higher Steering Committee for Green Growth). ▪ Facilitate partnerships with private sector and civil society institutions to support green growth planning and implementation. Monitoring/Reporting ▪ Provide quarterly status updates on the implementation of the action plan to MoEnv, Green Economy Unit (noting any challenges and requesting any needed support).
Ministry of Environment (MoEnv)	Green Economy Unit ▪ Work closely with Action Leads to provide policy analysis (undertaking policy review, cost-benefit analysis, supporting pre-feasibility analysis, conducting consultations to change policies or regulation) as needed to support implementation. ▪ Guide Jordan's green growth planning and implementation activities and facilitating collaboration amongst all stakeholders. ▪ Support line ministries with cross-sector coordination to support project design and implementation. Technical Units ▪ Multiple directorates working on cross-cutting green growth agendas (climate change, biodiversity and natural resources, and waste regulation) support line ministries with cross-sector coordination to support project design and implementation. Policies Unit ▪ Support with resource mobilization and partnerships. Higher Steering Committee for Green Economy (composed of Secretaries-General of each of the key line ministries) ▪ Responsible for reviewing and approving a results report on a bi-annual basis, and for submitting this to the Prime Ministry. Green Growth Technical Committee (composed of technical level focal points) ▪ Responsible for supporting action plan preparation and for reviewing and addressing implementation gaps and challenges on an ad hoc basis.

Stakeholder	Roles and Responsibilities
Ministry of Planning and International Cooperation (MOPIC)	Evaluation and Institutional Development Unit ▪ Reporting against the Jordan Vision 2025 and annual Executive Development Programs, economic growth and investment planning, and sustainable development planning. ▪ Ensure mainstreaming of green growth into the next national development plan (post-2025) and other cross-cutting national plans (Jordan Response Plan, Jordan Economic Growth Plan, etc.). Directorate for International Cooperation ▪ Coordinate with donors to link national priorities (projects and programs) with development assistance (grants, loans, public-private partnerships, etc.). Department of Statistics (DOS) ▪ Collect data to report against KPIs. Higher National Committee for Sustainable Development ▪ Provide guidance and follows up on all decisions, priorities and recommendations related to the 2030 Agenda.
Prime Ministry	Public-Private Partnerships Unit ▪ Determine which actions (or which components) are suitable and priority for developing public-private partnerships. Special emphasis is given to those investments that require strong government oversight, or where ability to generate revenues is weak in the initial payback period. ▪ Review and approve of implementation progress reports. Progress Unit ▪ Review and approve of progress reports against the Executive Development Plan and other national and sector-level plans, strategies, and projects.
Ministry of Finance	▪ Determine what level of contribution the government can make to action implementation at the sector level.
Jordan Investment Commission	▪ Coordinate with the line ministries to develop relevant actions into investment proposals and promote the projects to potential foreign investors. ▪ Facilitate foreign direct investment to achieve green growth implementation.
NGOs	▪ Support future action formulation by providing local context and technical expertise as needed. ▪ May be responsible for implementing actions in coordination with government or private sector.
Private sector	Private sector associations ▪ Support the development of market assessments/analysis to formulate better business models or revenue models for investment actions. ▪ Participate in regular public-private dialogue to identify gaps in regulatory environment or other barriers to investment and suggest solutions. Investors ▪ Provide feedback on project proposals and potentially invest in actions by providing grants, loans, or equity finance.

Coordination. Weak coordination between stakeholders is a green growth implementation barrier affecting all sectors and threatening the sustainability of green growth interventions. This fact has been well-documented in the Jordan Vision 2025, the Jordan Economic Growth Plan 2018-2022, the National Green Growth Plan, and through the consultation process for the development of this plan. To encourage greater future coordination and collaboration between sectors and institutions (public and private) all stakeholders must commit to developing a culture of knowledge exchange, innovation, sharing and collaboration. The government can play a leading role on the establishment of this culture through:

- Consolidating governance bodies where overlap exists, removing duplicate committees or governance units for the same issues;
- Upholding the highest standards of transparency and knowledge exchange, committing to sharing information as needed and following standard procedure for policy and project development;
- Hosting regular, inclusive sector-level donor and development partner consultations, and more frequent public-private-civil society dialogues on key policies and investments;
- Conducting more public outreach and awareness of government successes and lessons learned.

Financing Implementation. An estimated budget for implementation of each action is included in each action description in Chapter 5. This estimate is considered a starting point for detailed action planning. In some cases, implementation can be achieved at a lower cost, while others can be bundled with other programs/initiatives. The specific components of these programs and projects will likely differ during implementation. Line ministries implementing sectoral action plans are responsible for identifying the financial resources required for green growth action implementation, including using public budget where available and with sector donors. As implementation facilitators, MoEnv and MOPIC will support identification of off-budget resources for implementation to support SDG achievement and NDC implementation.

Official development assistance and climate finance are two sources of international finance that can be applied to green growth implementation. While technical assistance programs and demonstration/pilot projects may be easily financed by donors on a grant basis, investment in projects is a more resource intensive process. Infrastructure projects typically require substantial up-front costs, which tend to be financed with debt under long payback periods. Consequently, most of these investments will be owned either by the government or large institutional investors (or a mixture of ownership through PPP). These will require cost-benefit-analysis and investment planning in advance of implementation. Project implementers will work directly with the Ministry of Finance to ensure that the necessary investment conditions can be reached.

Capacity building and Institutional Development. The mainstreaming of green growth planning and implementation at the sector level will require continuous learning through capacity building and institutional development. The green growth analysis, objectives, implementation actions and results framework can be strategically mainstreamed at the sector level during sectoral planning exercises. Continuous development of the concept and its ramifications on sectoral development is needed for technical- and management-level government staff. MoEnv will aim to play an increasing role in supporting capacity building and institutional development with its partner ministries in the area of green growth and climate change.

Monitoring and Evaluation. Several donor-funded actions are included in the action plan, each with specific logic models and corresponding performance indicators as part of standard donor requirements. These will refer to and align with the overall results framework for the GG-NAP. Whenever possible, common indicators will be used to increase alignment and reporting schedules will be synchronized with the government of Jordan's fiscal year. Ongoing monitoring of the performance of individual sector actions will be the responsibility of the line ministry for the sector, as below, in coordination with the identified action "owner". Sector leads and the appropriate Action Leads will communicate any issues uncovered as part of their ongoing performance monitoring with MoEnv's Green Economy Unit.

Implementation Tracking. Implementation will be tracked jointly by the Green Economy Unit at the MoEnv, the relevant monitoring focal point at the sector ministerial level, and the Evaluation and Institutional Development Unit at the Ministry of Planning and International Cooperation (MOPIC). Key roles and responsibilities of all stakeholders responsible for pushing implementation are outlined below. Efforts will be taken within the first year to ensure sector-level commitment to implementation. MOPIC and MoEnv will work with action leads to ensure sufficient access to financial and technical assistance for implementation.

Communications. MoEnv will work to ensure effective communication across government institutions about the status of implementation of the GG-NAP. Projects that contribute to green growth will be entered into the Green Growth Tracking System developed by MoEnv, and the Ministry commits to ensuring regular updates on implementation.

4.2 Future Planning and the next phase (post-2025)

Sectoral Planning. Sector decision makers at the relevant line ministry and the MoEnv will seek to continuously support green growth mainstreaming at the sector level. This means using the objectives outlined in the action plan to guide implementation of sectoral policies and investments. Further, MoEnv will work with MOPIC to continuously seek to find and feature green growth actions under implementation in Jordan. Many existing or future actions that do not appear in the GG-NAP can still be considered green growth actions, and their impacts will be accounted for in green growth reporting. Lessons learned from these projects and programs will be compiled and reflected into the design of future projects and programs

Phase II Green Growth Action Planning. Action planning in the next phase will be less complex given the experience of developing this first action plan. The preparations for this shall begin in the fourth quarter of 2024, with ample time for consultation and review of lessons learned in Phase I. The implementation period for Phase II is expected to be 2026-2030, and, as such, will be closely aligned to the Sustainable Development (2030) Agenda and the NDC. Green growth action planning for Phase II can also be aligned with the next long-term national development plan developed by MOPIC, the follow-up to the Jordan Vision 2025. For this process, MoEnv and MOPIC will work together to undertake consultations at the sector level, provide capacity building and strategic visioning workshops, and support green growth action ideation and formulation. Advance consultation with donors to the extent possible, and identification of public budget for green growth implementation, is needed.

5. Agriculture Sector Green Growth Actions 2021-2025

The following 14 priority actions have been identified for implementation in the 2021-2025 period. These interventions are estimated to cost USD 193,900,000, and include:

- **7 investment preparation and demonstration actions.** These projects are at various levels of readiness: some require feasibility analysis, while others are investment-ready. Many are suitable candidates for public-private partnerships or direct private sector investment, and others are opportunities to leverage climate finance.

- **7 enabling policy and institutional reform actions**. Given current gaps in available fiscal resources, these actions intend to attract investment by address policy barriers and capacity gaps that lead to higher costs, risk levels or uncertainty in decision making. These include programs to support innovation, institutional reform and coordination.

Implementation of these actions will contribute to the Agriculture Sector Green Growth Sub-Objective and the following:

- Increase investment in future-oriented techniques, technologies and business models that will contribute sectoral growth.
- Improve the processes and tools at government's disposal for sectoral planning across the full agricultural and food production value chain, from farm to market.
- Reduce the environmental impact of the sector by mainstreaming landscape restoration, forestry and resource efficiency measures into agriculture sector activities.
- Increase opportunities for farmers and rural communities to improve their skills and access to finance to promote sustainable livelihoods and decent, green jobs in the sector.

Table 7, which shows the agriculture sector green growth actions, can be used by action owners to begin project proposal formulation for the purpose of mobilizing public budget or external grants, loans or other financial support for implementation. It is understood that detailed implementation approach, outputs, timeline, budget, and stakeholders may change depending on the source of finance during the process of implementation.

TABLE 7
Agriculture Sector Green Growth Actions 2021-2025

#	Action Title	Page #	Total Estimated Implementation Cost (USD)	Relevant Green Growth Objectives				
				Enhanced Natural Capital	Sustainable Economic Growth	Social Development and Poverty Reduction	Resource Efficiency	Climate change Mitigation and Adaptation
AG01	Design and implement capacity building program for green growth planning and implementation in the agriculture and forestry sector	29	1,500,000	x	x	x		
AG02	Mainstream green growth into the provision of agriculture extension services and explore options to improve their long-term sustainability	31	5,000,000	x		x	x	x
AG03	Map and optimize research to impact pathways to improve relevance of innovation efforts in the agriculture sector	33	2,000,000		x	x	x	x
AG04	Undertake sector reforms to improve access to finance for small farmers	35	3,500,000		x	x	x	x
AG05	Develop a flexible crop planning and variety selection methodology and decision-making process based on crop-per-drop and economic competitiveness	37	7,500,000		x	x	x	x
AG06	Design and implement program support demosntration resource efficiency projects in the olive cultivation and oil production sector	39	25,000,000		x		x	
AG07	Develop and implement pipeline of projects (all sizes) and policy recommendations to increase use of aquaponics and hydroponics in urban and rural areas	41	21,000,000	x	x	x	x	
AG08	Conduct national prefeasibility and market assessment to measure and leverage agriculture sector biowaste to resource potential	43	11,500,000	x	x		x	
AG09	Develop a long-term agriculture sector market development strategy and action plan (rationalizing and directing domestic consumption, export, imports)	45	2,000,000		x			x
AG10	Upgrade packaging, scaling, storage and cooling of fruits and vegetables managed by the private sector	47	15,200,000		x	x	x	
AG11	Promote the development of organic agriculture through knowledge exchange and market development	49	1,700,000	x	x	x		
AG12	Establish an agricultural insurance company and develop agricultural risk mitigation strategy	51	52,000,000		x	x		x
AG13	Develop and implement a National Afforestation Program in Jordan	52	40,000,000		x	x	x	x
AG14	Support rural green growth and employment through ecosystems restoration	55	6,000,000	x		x		x

AG01 | Design and implement a program to increase the use of evidence-informed green growth planning and implementation capacity in the agriculture and forestry sector

Description
Inclusive governance, effective partnerships and evidence-informed decision making are a critical component of any sector's ability to achieve economic growth, job creation and rural development in a sustainable way. Stakeholders must work together closely to exchange and apply lessons learned to the policy and investment decision making process. As the main authority guiding sectoral development, the MoAg is increasingly involved in all aspects of agricultural development, including economic planning and strategy, policy development, research, extension services (guidance), marketing and private sector development, forestry and rangelands management, animal production, plant production, natural resource protection and human resource development. At the same time, many quasi-governmental and private sector institutions implement projects and undertake economic activities that can inform and improve decision making abilities. These include relatively large research institutions (NARC, universities, etc.) and private sector groups (Jordan Exporters and Producers Association (JEPA), JFU, JCC, Jordan Engineers Association (JEA) etc.), as well as a large number of cooperatives, private sector associations and NGOs. However, through the process of developing the GG-NAP, the following capacity gaps were observed: 1) weak institutional coordination and collaboration, 2) low awareness of decision makers and stakeholders on the topics of green growth and climate change (from a conceptual and strategic standpoint), 3) weak access to data and capacity to utilize it for decision making. **The purpose of this action is to strengthen agriculture sector governance by building a shared understanding and vision for green growth among sector stakeholders through building the capacity of government decision makers to apply evidence-informed decision making.** The action will assess the decision-making process within government institutions and the mechanisms through which private sector and civil society actors are included in decision making. The project will also assess data availability, gaps and needs as well as the current capacity of key stakeholders in utilizing this data. A training program will then be designed for stakeholders to improve their awareness of data for making informed decisions around sustainability and environmental, social and economic co-benefits and their ability to utilize this data in the various decision-making processes. Finally, the program will also increase sector stakeholders' understanding of relevant activities ongoing in other sectors and develop recommendations for institutional reforms that can be taken to improve overall sector performance.

Action Objectives	▪ Increase awareness of the role of the agriculture and forestry sectors in supporting climate change mitigation and adaptation, competitiveness, as well as sustainable consumption and production. ▪ Improve the quantity and quality of data collected in the agriculture and forestry sectors to measure water and energy use, environmental quality, and climate resilience. ▪ Link specific data points to green growth objectives, clarifying decision making procedures for key issue areas (governance, marketing, forestation, water use, etc.), and systematizing the use of this data in decision making. ▪ Improve coordination and collaboration between government, private sector, and research to improve policy and investment decision making.
Implementation Milestones	▪ **Perform a mapping and gap analysis** of the information flows from key institutions including MoAg, MWI, NARC, DOS, MoEnv and other data generators. Gaps in the availability of key green growth metrics should be mapped and compiled, which will be the basis for the development of a capacity building and training program. ▪ **Undertake a capacity building needs assessment of sector stakeholders** to better understand the ways in which data and access to data influence decision making, how training should be delivered to best increase understanding and data application, as well as stakeholder needs for specific data and data types.

Implementation Milestones	▪ **Design one capacity building program and training for relevant stakeholders** based on the five dimensions of green growth in the agriculture sector. Recipients of the training will be informed about the challenges and opportunities for green growth in the sector, the breadth and depth of data available for decision making, the gaps in data availability and its impact on the sector's green growth performance. ▪ **Develop recommendations for improving the process for policy and investment decision making** by the government, including through the use of data, cost-benefit analysis, coordination and collaboration, and project cycle management approaches. This will include recommendations for key institutional reform measures (regulations, by-laws, organizational structure, etc.) to improve the efficiency and effectiveness of decision making.
Relevant Green Growth Objectives	▪ **Sustainable Economic Growth** – (a) Increase evidence-based decision making by public and private sector agriculture stakeholders; (c) Enhance the quantity and quality of public-private-civil society exchange regarding agriculture sector development.

Estimated Implementation Period	
Start Year — 2021	*End Year* — 2023

Location(s)	National	**Other key partners**	All sector stakeholders will be involved in identifying gaps and needs.
Implementing Stakeholders	*Lead* MoAg, MoEnv, DOS *Support* GGGI, FAO, Netherlands Embassy	**Estimated Budget for this Action**	USD 1,500,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	To be determined (TBD)
Action leads to investment	☐ Yes ■ No ☐ This action is an Investment opportunity	**Estimated Investment Size**	-

Level of Priority			**Readiness for Implementation**				
Very High	High	Medium	1	2	3	4	5

Implementation Risk Mitigation Measures	▪ Widespread stakeholder involvement is critical to achieving the intended outcomes from the action, including government and non-government. ▪ The details of this program should be designed in close cooperation with sector leaders to ensure accurate depiction of its decision-making processes.

AG02 Mainstream green growth into the provision of agriculture extension services and explore options to improve their long-term sustainability

Description
Agricultural extension services are advisory services provided to farmers to improve their knowledge and ability to apply certain skills and techniques for the purpose of improving their productivity, and thereby ensure strong sectoral performance. Provided primarily as a service to small farms, extension programs have been shown to increase farm revenue, increase land and resource productivity, reduce poverty and improve the overall impact that agricultural activities have on the economy and rural communities. A strong program of extension services also provides a productive feedback loop between policy makers and farmers/practitioners, where real-time challenges can be identified, and innovation and research can be adapted to on-site needs. As climate change and trade disruptions place growing pressure on Jordan's agriculture sector, extension services must evolve to address the needs of farmers as well as the environmental realities threatening their livelihoods. In Jordan, extension services have historically been provided by a wide range of actors. Many farmers report that they receive advice and training directly from private sector seed and fertilizer suppliers, with additional support from the MoAg's farmer trainers and field offices, in addition to research institutions such as NARC and universities. While large farmers have the financial resources to invest in more advanced inputs, techniques, and technologies to make their farms more productive and more resilient to both climate change and pests, many smaller farmers struggle to compete. They lack the access to capital to expand, the capacity to achieve economies of scale, and often the basic awareness about the importance of environmental stewardship to protect their livelihoods. Several gaps in Jordan's extension services have been identified: 1) few trained subject-matter experts to address the specific needs of Jordanian farmers; 2) low use of technology in the provision of services; 3) lack of productive feedback loops to inform policy or promote inclusive agricultural planning. **The purpose of this action is to increase the quantity and quality of Jordan's agricultural extension services and explore the options for expanding access to extension services.** First, the action would support the development of green growth training modules for current and future extension officers. Officers would then participate in developing training modules for farmers based on green growth concepts and deliver them to a selected group of recipients, with a strong focus on building market orientation. Second, a feasibility analysis will be undertaken to determine how public funds for extension services can be most effectively utilized, and what market opportunities might exist for private sector provision of extension services. This will be used to develop policy recommendations for education and entrepreneurship promotion institutions.

Action Objectives	▪ Green growth concepts mainstreamed into the extension services strategy and action plan for the MoAg. ▪ Ensure stronger link between MoAg's green growth objectives and activities taking place on farms. ▪ MoAg's extension agents are sufficiently trained and prepared to deliver high-quality, high-impact support to farmers. ▪ Identify opportunities for private sector development of agricultural extension and advisory services.
Implementation Milestones	▪ **Develop one green growth training program** for agricultural extension officers, aimed at increasing their understanding of green growth and its relationship to the experience of farmers in Jordan. Special focus will be placed on the link between the environmental, social, and economic performance of the sector, along with the backward and forward linkages between policy making, investment, trade, and employment in the agriculture sector. ▪ **Undertake inclusive farmer training module development** by bringing national stakeholders, green growth experts, and extension officers together to identify key messages, techniques, and skills farmers need to help achieve green growth objectives, with a strong focus on improving farmers' market orientation, resource efficiency, and climate smart agriculture. ▪ **Design and implement a Training of Trainers (ToT)** program for extension agents, to be delivered to target farmers as an extension service through the MoAg. ▪ **Update the Extension Services Strategy and Action Plan** to ensure strong orientation and mainstreaming of green growth, and map the gaps and challenges in service provision. ▪ **Design a national M&E system** to measure outcomes as a result of investment in extension services to support prioritization of service provision and staffing decisions.

Implementation Milestones	▪ **Develop one options analysis** to explore how to promote the development of supplementary private sector-based or quasi-governmental agricultural extension services; this will suggest business models for new Micro, Small and Medium Enterprises (MSMEs), PPP options, and university/research partnership options for long-term improvement in access to extension services; innovative financing arrangements and sources of finance will be explored. ▪ **Develop a set of institutional reform recommendations** based on the options analysis to determine the necessary actions to streamline and improve the government's extension services and reduce the burden on public budget while maintaining a high quality of service, strong feedback loops, and ultimately achieving green growth mainstreaming at the farm level.
Relevant Green Growth Objectives	▪ **Social Development and Poverty Reduction** - Improve the skills and capacity of farmers and rural communities to undertake sustainable agriculture. ▪ **Natural Capital** - Increase the area of degraded lands for restoration in the rangelands/ Badia ecosystem. ▪ **Climate Change Adaptation and Mitigation** - Introduce the concept of 'climate smart' agriculture to farms through extension services. ▪ **Resource Efficiency** - Increase use of resource efficient, cost-saving, environmentally friendly farming techniques and downstream processing technologies.

Estimated Implementation Period	
Start Year — 2021	***End Year*** — 2024

Location(s)	National	**Other key partners**	JVA, MWI, MoEnv, ICARDA
Implementing Stakeholders	***Lead*** MoAg ***Support*** JEA, NARC, Agriculture Faculties in Jordanian universities	**Estimated Budget for this Action**	USD 5,000,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	USDA, FAO, GIZ, JICA, Netherlands Embassy
Action leads to investment	☐ Yes ■ No – This action may result in an investment opportunity if a viable business model can be developed for private sector-based extension services. ☐ This action is an Investment opportunity	**Estimated Investment Size**	-

Level of Priority			**Readiness for Implementation**				
Very High	High	Medium	1	2	3	4	5
▪ Studies have been conducted on extension services in Jordan, but no specific proposals have been developed.							

Implementation Risk Mitigation Measures	▪ Action sustainability can be in question, as this action concerns training and extension services. The action implementing organizations are required to investigate and assess the potential for institutionalization of the ToT program as an income generating unit.

AG03 | Map and optimize research to impact pathways to improve relevance of innovation efforts in the agriculture sector

Description
Agriculture research is undertaken by a wide variety of actors in Jordan, including universities, NARC, and private sector actors and associations. Much of this research is funded through public resources with support from donors and development partners. As a result of these efforts, Jordan has managed to make some interesting advances, improving implementation of water efficiency measures in agricultural production, such as through the introduction of soilless systems. However, there remains an overall lack of efficiency and effectiveness of innovation efforts in the agriculture sector, as well as a lack of coordination to develop research into implementable projects and business models. To increase the level of implementation and application of research and innovation efforts requires a stronger research agenda that is linked to policy objectives, and stronger leadership to coordinate national stakeholders toward specific objectives is needed. Key gaps in the current system include: 1) lack of a common vision in government and development agencies/donors[75]; 2) lack of coordination between national research institutions (including private sector research), leading to low levels of knowledge exchange; 3) lack of attention to business models and market orientation for innovation efforts, leading to low application. **The purpose of this action is to improve institutional coordination and increase effectiveness of agricultural research and innovation activities taking place in the Kingdom.** By doing so, public finances and donor funds being used for research and innovation can be more efficiently allocated and more effectively used, as well as lead to greater on-the-ground application and improved sectoral performance. If efforts are channeled to address green growth challenges, economic growth, job creation, and sustainable agricultural practices can be achieved.

Action Objectives	▪ Increase awareness and knowledge sharing around research and innovation efforts being conducted in Jordan. ▪ Increase the effectiveness of all national research and innovation efforts being conducted for the agriculture sector. ▪ Identify solutions to private sector challenges to achieving agriculture sector growth and modernization while ensuring natural capital is maintained. ▪ Develop recommendations for TVET and education sectors on reforms needed in training and education curricula to support research to impact pathways.
Implementation Milestones	▪ **A national "Agricultural Research to Impact Committee"** established and operated, co-chaired by the MoAg and NARC. ▪ **One situation analysis and stakeholder mapping** developed, compiling all research and innovation efforts taken as well as resources allocated to agriculture in Jordan, including public funds and donor funds. ▪ **One 10-year agricultural research-to-innovation plan** developed to focus on achieving key agriculture and forestry green growth milestones, including an M&E system to track achievements against innovation targets. ▪ **Fund raising strategy and action plan** developed and efficiently implemented to sponsor the implementation of the 10-year research and innovation plan, with special attention to prioritization of efforts, leveraging the strengths of different institutions and partners. ▪ At least **10 research-to-innovation projects** sponsored, implemented and used to bring innovation to achieving key agriculture and forestry green growth milestones during the period 2021-2025. This includes the development of business models for each research to innovation project (policy, feasibility, intellectual property rights, market need, access to markets, etc.) to improve market orientation and potential for implementation or commercialization.

[75] Gregory N. Sixt, Laurens Klerkx, Timothy S. Griffin. Transitions in water harvesting practices in Jordan's rainfed agricultural systems: Systemic problems blocking mechanisms in an emerging technological innovation system. Environmental Science and Policy 84 (2018) 235-249.

Relevant Green Growth Objectives	▪ **Sustainable Economic Growth** – 1) Enhance the quantity and quality of public-private exchange regarding agriculture sector development; 2) Increase public and private investment in technology for modernizing and greening on- and near-farm agricultural processes. ▪ **Social Development and Poverty Reduction** - Increase awareness and exposure to sustainable agriculture practices, particularly in youth. ▪ **Climate Change Mitigation and Adaptation** - Introduce the concept of climate smart agriculture on farms. ▪ **Resource Efficiency** - Increase use of resource efficient technology to reduce consumption and cost of water, energy, and waste management on farms and in agro-processing.

Estimated Implementation Period	
Start Year — 2021	***End Year*** — 2025

Location(s)	National	**Other key partners**	All sector donors
Implementing Stakeholders	***Lead*** MoAg ***Support*** NARC, research institutions and universities, MoEnv, RSCN, private sector, MITS, JEDCO	**Estimated Budget for this Action**	USD 2,000,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	-
Action leads to investment	☐ Yes ■ No – However, better elaboration of strategic targets for innovation will likely result in much more investment. ☐ This action is an Investment opportunity	**Estimated Investment Size**	-

Level of Priority			**Readiness for Implementation**				
Very High	High	Medium	1	2	3	4	5

Implementation Risk Mitigation Measures	▪ Contribution to the gap analysis and securing commitment from major funders of research and innovation activities is critical. ▪ Resources from the government for long-term management of this issue will be critical.

AG04 | Undertake sector reforms to improve access to finance for small farmers

Description
Investment in the agriculture sector has rebounded in recent years, but more support is needed to modernize and green the sector. While government investment in the sector has decreased substantially since the global economic crisis of 2008 (with a more than 45% increase in administrative costs)[76], overall investment in the sector between 2009 and 2016 has shown an increase in capital investment (in, for example, land, livestock, storage, supplies, tools, irrigation systems, seeds, fertilizers, etc.) and a decreased investment in labor (primarily as a result of access to relatively cheap foreign labor).[77] However, the sector still lacks modernization and innovation. The poultry industry has been its best performer over the last few years. This industry dominates the livestock sector (more than 50%), which allows it to meet more than 80% of local chicken demand and 95% of the demand for fresh eggs. The success factors for this should be studied and replicated. The Agriculture Credit Corporation, which financed 8,490 of loans for farmers in 2018, at a total value of approximately 46.96 million JOD[78] is mandated with extending special, subsidized credit to farmers who want to purchase equipment for their farms. Much more is needed to raise awareness and access to finance for modern, resource efficient farming technology to stimulate green investments. **The purpose of this action is to increase the amount of finance available to farmers, Small and medium-sized enterprises (SMEs) and larger agro-processing companies to upgrade technologies to become more resilient to climate change, to achieve cost savings through resource efficiency, and to promote productivity (improving profits and revenues).** The intention is for a mix of public funds from national and international sources to establish a fund within the Agriculture Credit Corporation, the Cities and Villages Development Bank, or other national financing institutions that can provide subsidized loans, grants, guarantees, etc. that can support beneficiaries in purchasing equipment to improve their on-farm water, energy or waste efficiency, or to cultivate more drought-tolerant crops, or those which are more resilient to climate-related sources of destruction.

Action Objectives	▪ Reduce the vulnerability to climate change of Jordan's agricultural system, particularly from its impacts on water resources, by testing innovative and efficient water-use technologies. ▪ Promote technically reliable, economically competitive, clean, and sustainable irrigation technology for the agricultural sector in different agro-climatic regions in Jordan. ▪ Create awareness among the farming community of the need to adopt new technologies and ways to improve their use of such technologies.
Implementation Milestones	▪ **One report developed to identify critical technologies.** needed to address climate change and improve resource efficiency in the farming and agro-processing sectors, in cooperation with national R&D agencies. It should incorporate the findings of the National Sustainable Consumption and Production Strategy and Action Plan, the Climate Change Technology Needs Assessment, and the National Adaptation Plan. ▪ **One feasibility assessment** of the legal, institutional, and technical requirements for establishing such a fund. ▪ **A business model for a financing facility or fund** dedicated to enhancing farmers' access to these critical technologies (to be operated from within the government, private sector or PPP). ▪ **A farm-level audit program** developed and implemented jointly between the MoAg, Office of Extension Services, and NARC. ▪ **One awareness-raising program for farmers and agriculture sector investors** developed regarding the potential to apply selected technologies to promote long-term cost savings and environmental sustainability (resource efficiency and climate resilience). The campaign can include communications at the national level using social media, events and workshops; or be a targeted campaign to demonstrate project pilot areas using multimedia material, seminars and study tours. ▪ **Pilot and conduct experimental implementation of the developed tools** and the climate smart technology implemented and evaluated, targeting up to 50 farmers. ▪ **A roadmap for the establishment and operation of the financing facility**, including a fundraising strategy, developed based on the results of the pilot projects' implementation.

[76] Inform. "Assessment of the Agricultural Sector in Jordan," 2012.
[77] WANA. "Investment and Employment Trends in Jordan ' s Key Economic Sectors," 2019.
[78] ACC. "Annual Report 2018," 2018.

Relevant Green Growth Objectives	▪ **Social Development and Poverty Reduction** - Reduce the impact of environmental and economic shocks on the most vulnerable members of society (particularly farmers and rural communities). ▪ **Resource Efficiency** - Increase irrigation water use efficiency through introduction of new policies, techniques, and technologies. ▪ **Climate Change Adaptation and Mitigation** - Develop and implement policy and fiscal tools that encourage the take-up of adaptive techniques and technologies. ▪ **Sustainable Economic Growth** - Increase public and private investment in technology for modernizing and greening on- and near-farm agricultural processes.

Estimated Implementation Period	
Start Year — 2022	***End Year*** — 2024+

Location(s)	Nationally	**Other key partners**	Donors/ development partners.
Implementing Stakeholders	***Lead*** ACC, MoAg ***Support*** NARC, MoF, MOPIC, Higher Council for Science and Technology, MWI, MoEnv	**Estimated Budget for this Action**	USD 3,500,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	To be determined (TBD) in the validation phase
Action leads to investment	■ Yes ☐ No ☐ This action is an Investment opportunity	**Estimated Investment Size**	USD 50 to 100 million

Level of Priority			**Readiness for Implementation**				
Very High	High	Medium	1	2	3	4	5

Implementation Risk Mitigation Measures	▪ Policies and incentives to facilitate investments in modernization are essential. Fiscal incentives should be considered where they can be more effective than the proposed facility. ▪ Awareness about the availability of appropriate technologies and financing options needs to be built, so collaboration with extension, local government, private sector suppliers, and farmers' associations is key.

AG05 | Develop a flexible crop planning and variety selection methodology and decision-making process based on crop-per-drop and economic competitiveness

Description
The purpose of this action is to empower decision makers in the MoAg with the necessary data and analysis to better organize and enforce agricultural production in Jordan. The project would provide a suite of information technology, training, and process reforms that would increase collaboration and feedback loops between the government's external trade promotion apparatus, and the domestic agriculture sector (responsible for producing goods for export and domestic consumption). The reform would mainstream the concepts of climate change resilience and environment resource efficiency, by ensuring that water footprint is a core criterion in the determination of which crops can be grown and exported from Jordan. This project is consistent with the National Export Strategy 2014-2019 and will require substantial collaboration between the DOS, MoAg, Ministry of Trade Industry and Supply, Ministry of Foreign Affairs (trade offices in particular), JIC and the NARC.

Action Objectives	▪ Increase the crop-per-drop efficiency of water used in the agriculture sector. ▪ Promote the use of data and simulation models for improved crop planning.

Implementation Milestones	▪ **Research Partnerships established.**
	▪ **Climate and crop data collected** for the base period and the future (2020-2050) to support crop simulation.
	▪ **A crop simulation model** (using, for example, DSSAT and IDSS models), developed for Jordan, to produce a simple representation of fruit and vegetable crop productivity under different (1) water supply, (2) temperature and (3) land degradation scenarios, with the ability to assess the variances in impact between crops and crop varieties.
	▪ **Development of a national report, including maps and an awareness campaign,** which encompasses:
	  ▪ Projection of the effects of climate change on existing crops in the future, and the impact on economic growth, jobs, and environmental quality (water and land).
	  ▪ Assessment of the water and land/soil impacts of various crops, varieties, and landraces under different climate change conditions.
	  ▪ Changes needed to align agricultural production priorities with higher crop-per-drop efficiency, improved livelihood impacts, and enhanced climate resilience.
	  ▪ Consult farmers and private sector stakeholders to validate the model and address key concerns and implications of the report.
	▪ **Extension and Market Development Applications designed and implemented:**
	  ▪ A website detailing recommendations and open access to data for farmers and research institutions.
	  ▪ Training courses on how to use the model developed and delivered to agriculture researchers, engineers, extension agents, and sector planners.
	  ▪ Alignment of large and small holder farmers' business plans (crop and variety choices, water demand, etc.) and availability of necessary seeds and cultivation technologies.
	  ▪ Crop planning, trade and marketing strategies and decision-making procedures reformed to ensure optimal environmental, economic, and social benefits are derived from crop planning and agricultural production policies.

Relevant Green Growth Objectives	▪ **Resource Efficiency** - Increase irrigation water use efficiency through the introduction of new policies, techniques, and technologies. ▪ **Sustainable Economic Growth** - Increase evidence-based decision making by public and private sector agriculture stakeholders. ▪ **Social Development and Poverty Reduction** - Reduce the impact of environmental and economic shocks on the most vulnerable members of society (particularly farmers and rural communities). ▪ **Climate Change Adaptation and Mitigation** - Increase use of high-yield, drought and salinity-resistant plant varieties.

Estimated Implementation Period	
Start Year – 2022	*End Year* – 2025

Location(s)	National	**Other key partners**	Netherlands Embassy.
Implementing Stakeholders	*Lead* MoAg *Support* NARC, DOS, JEPA, MoEnv, Ministry of Industry and Trade, MWI, JVA.	**Estimated Budget for this Action**	USD 7,500,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	Netherlands Embassy, World Bank, ICARDA.
Action leads to investment	☐ Yes ■ No - Subject to the outcomes from action implementation, it is likely that new investment opportunities (technologies and expansion in varieties) will appear ☐ This action is an Investment opportunity	**Estimated Investment Size**	-

Level of Priority			Readiness for Implementation				
Very High	High	Medium	1	2	3	4	5

Implementation Risk Mitigation Measures	▪ Awareness of the projected impact of climate change on the sector to be built with all stakeholders.

AG06 | Design and implement program to support demonstration resource efficiency projects in the olive cultivation and oil production sector

Description
The purpose of this action is to improve resource efficiency in agricultural subsectors, starting with the olive sector, one of the most important and potentially profitable agricultural sub-sectors. For this action, a full sub-sector assessment will be conducted to identify sources of waste within the full value chain of economic activities of the sub-sector, from cultivation, to transport, to process and export. Specific attention will be given to water and energy inefficiency, as well as circular economy opportunities related to the waste byproducts of the sub-sector. Specific attention will also be given to Jordan products' position in the global market and the measures needed to strengthen the branding and marketing of olive products globally, to thus grow Jordan's market share. The package of interventions and locations of sites for demonstration should be determined through a transparent process. The goal will be to demonstrate product improvement and cost savings for olive farmers and oil producers, and to demonstrate proof of concept for resource efficiency programs in other agriculture sub-sectors.

Action Objectives	▪ Grow Jordan's business case for the olive value chain, and enhance Jordan's market share of the international olive and olive oil market. ▪ Establish the business case for greater investment in resource (water, energy and waste) efficient cultivation and production. ▪ Increase awareness among olive farmers and olive oil producers about the green growth challenges and opportunities associated with their sub-sector. ▪ Demonstrate proof of concept on a group of olive farms and olive oil production facilities.

Implementation Milestones	▪ **Market assessment study discussing Jordan's position in the international olive products' value chain**, and providing accurate, precise, and fundamental recommendations to enhance Jordan's market share of the international market through quality assurance, branding and marketing, reduction of production costs, and growing productivity.
	▪ **Branding and marketing strategy**, in addition to an action plan, developed and implemented with the purpose of enhancing Jordan's market share of the international olive and olive oil market.
	▪ **One feasibility study examining the potential impact of investing in resource efficiency technologies** and process upgrades on Jordan's olive farms and in olive oil production facilities, including but not limited to:
	  ▪ Improved water harvesting (with solar pumping), drip irrigation, mechanized cultivation, optimal storage facilities, and other relevant interventions on-farm.
	  ▪ Improved pressed olive cake waste collection and reuse (including compost, fertilizer production, on-site treatment and/or off-site transport and treatment facilities), renewable energy, and zibar (wastewater) re-use applications.
	▪ **One project design and proposal for a number of farms and processing facilities** (number TBD based on feasibility study findings).
	▪ **Investment in demonstration project sites and final report**, with recommendations for scalability and replicability in other key agriculture sub-sectors.

Relevant Green Growth Objectives	▪ **Resource Efficiency** – 1) Increase irrigation water use efficiency through introduction of new policies, techniques and technologies 2) Increase the amount of the sector's 'waste' biomass used as a resource (e.g., compost, energy, and food/fodder value-add); 3) Increase use of resource efficient technology to reduce consumption and cost of water, energy and waste management on farms and in agro-processing. ▪ **Sustainable Economic Growth** - Increase public and private investment in technology for modernizing and greening on- and near-farm agricultural processes.

Estimated Implementation Period	
Start Year – 2021	*End Year* – 2024

Location(s)	National	**Other key partners**	FAO, AFD
Implementing Stakeholders	*Lead* MoAg *Support* Jordan Olive Oil Producers Association, Jordan Olive Products Exporters Association, NARC	**Estimated Budget for this Action**	USD 5,000,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	European Bank for Reconstruction and Development (EBRD).
Action leads to investment	■ Yes ☐ No ☐ This action is an Investment opportunity	**Estimated Investment Size**	USD 20,000,000

Level of Priority			Readiness for Implementation				
Very High	High	Medium	1	2	3	4	5

- Analysis currently being undertaken by EBRD to explore potential support for this sector.
- Farmers have expressed their willingness to invest/co-invest in efficiency upgrades under the right conditions.

Implementation Risk Mitigation Measures	▪ A strong M&E system is required for this action in order to make the case for long-term cost saving and efficiency impacts. ▪ Participatory approach is highly advisable with all key related stakeholders thus to ensure the buy-in of integrated green growth approaches at value chain level.

AG07 Develop and implement pipeline of projects (all sizes) and policy recommendations to increase use of aquaponics and hydroponics in urban and rural areas

Description
Many studies and experts suggest that there is a great potential to improve water efficiency and climate change adaptation, as well as boost agricultural productivity, by substantially scaling up the use of aquaponics and hydroponics in Jordan. However, up to now the practice is still relatively uncommon, especially urban areas or large or mega-scale. This is due to a lack of technical understanding among farmers about how to conduct soilless agriculture, and a lack of access to the technologies needed to make use of this approach. **The purpose of this action is to identify the policy and investment parameters for the scale up of investment in soilless agriculture, specifically hydro and aquaponics, and to prepare a pipeline of projects that will catalyze a sector-level shift away from business as usual and towards greater water efficiency.**

Action Objectives	▪ Support the scale-up of hydroponics and aquaponics production of relevant crops to increase irrigation efficiency and productivity in the agriculture sector. ▪ Identify policies and incentives needed to encourage urban and rural use of hydroponics and aquaponics for food production. ▪ Identify short- and medium-term targets for expansion of hydroponics and aquaponics, as well as stakeholders/institutions required to support implementation.
Implementation Milestones	▪ **One feasibility study** for the production of crops using hydroponics and aquaponics in Jordan – measuring setup costs and barriers to accessing finance, awareness and technical capacity, farmer interest in growing and consumer demand, in addition to cost savings and environmental benefits captured from reduced water and energy use. ▪ **One set of policy recommendations** identifying policies and incentives needed to encourage expansion in the use of the technologies, provide extension support for capacity building, expand the market for produce grown through hydroponics/aquaponics. ▪ **One knowledge exchange program** that brings together agriculture sector stakeholders from MENA and Mediterranean regional governments to better understand the policy and investments barriers to soilless agriculture and approaches to overcoming them. Lessons learned from this experience will be fed into policy recommendations. ▪ **One pipeline of projects** and a process for sharing calls for proposals to setup hydroponics and aquaponics operations around the country. ▪ **Up to 30,000m2 of greenhouses and soilless systems developed in rural and urban areas** for growing vegetables, herbs and leafy crops, using 50-80% less water and renewable energy to green the agricultural value chain in five different locations TBD by the feasibility study.
Relevant Green Growth Objectives	▪ **Resource Efficiency** - Increase irrigation water use efficiency through introduction of new policies, techniques, and technologies. ▪ **Natural Capital** – Reduce air, soil, and water pollution resulting from agriculture and food production processes. ▪ **Sustainable Economic Growth** – Improve the quantity and quality of agricultural products sent to market (export and domestic). ▪ **Social Development and Poverty Reduction** - Reduce the impact of environmental and economic shocks on the most vulnerable members of society (particularly farmers and rural communities).

Estimated Implementation Period	
Start Year – 2021	*End Year* – 2023

Location(s)	National	**Other key partners**	German-Jordan University, Jordan University of Science and Technology, Eco-consult (private Jordanian firm with experience in this field).
Implementing Stakeholders	*Lead* MoAg *Support* Agriculture Engineers Association, JEPA; Jordan Fisheries Association	**Estimated Budget for this Action**	USD 6,000,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	World Bank
Action leads to investment	■ Yes ☐ No ☐ This action is an Investment opportunity	**Estimated Investment Size**	USD 15,000,000

Level of Priority			Readiness for Implementation				
Very High	High	Medium	1	2	3	4	5

- The World Bank is currently funding a project titled "Exploring High-Value, Socially Inclusive and Water-Efficient Agriculture", from which lessons could be learned and projects developed.

Implementation Risk Mitigation Measures	▪ Build awareness for consumers and for possible users of the technology, as well as private sector distributors of produce resultant from aquaponic and hydroponic production.

AG08 | Conduct national prefeasibility and market assessment to measure and leverage agriculture sector biowaste to resource potential

Description
There are several sources of biowaste that result from agriculture sector processes: manure (from chickens and cows), biomass from slaughterhouses, post-harvest losses, and others. This waste material has a calorific value that allows it to be digested or incinerated in such a way that the byproducts can be used for energy, or to create additional agriculture inputs such as fertilizer and compost. **The purpose of this action is to assess the market for such interventions and identify the investment and policy parameters needed to implement different types of waste-to-resource interventions.** Implementation of this action will require collaboration with municipal waste authorities, private sector (particularly large industrial biomass waste producers in the food and textile production industry), and research and innovation enablers.

Action Objectives	▪ Identify the opportunities to promote circular economy through agricultural biowaste reuse. ▪ Identify the necessary policy measures and incentives required to scale up implementation of agriculture sector biowaste-to-resource projects (such as biogas generation, compost and fertilizer production, etc.).
Implementation Milestones	▪ One **market assessment** detailing the composition, size, and geographical distribution of different agriculture sector biowaste streams, including from livestock, post-harvest losses, and other sources. ▪ One **pre-feasibility study** providing the cost-benefit analysis of a short list of priority projects, as well as recommendations for project formulation and financing options for public, private and PPP project designs. ▪ One **strategic environmental assessment** to identify the opportunities to integrate environment, and social sustainability goals into the project design. ▪ One **awareness-raising and capacity building program** to collect feedback on the studies, coordinate project development, and explain the process for project development to interested private sector investors.
Relevant Green Growth Objectives	▪ **Natural Capital** - Reduce air, soil, and water pollution resulting from agriculture and food production processes. ▪ **Resource Efficiency** – Increase the amount of the sector's waste biomass used as a resource (e.g., compost, energy and food/fodder value-add, etc.). ▪ **Sustainable Economic Growth** – Enhance the quantity and quality of public-private-civil society exchange regarding agriculture sector development.

Estimated Implementation Period	
Start Year – 2021	*End Year* – 2022

Location(s)	TBD/National	**Other key partners**	UNDP
Implementing Stakeholders	*Lead* MoAg *Support* Private sector (farmers, associations, unions, etc.), MOLA, Municipal authorities (Greater Amman Municipality (GAM), ASEZA, PDTRA), MoEnv.	**Estimated Budget for this Action**	USD 1,500,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	Private sector investments or municipal investments, or a mix through PPP.
Action leads to investment	■ Yes ☐ No ☐ This action is an Investment opportunity	**Estimated Investment Size**	USD 10,000,000

Level of Priority			Readiness for Implementation				
Very High	High	Medium	1	2	3	4	5
▪ Pilot projects have been developed and proof of concept has been reached on a small scale.							

Implementation Risk Mitigation Measures	▪ Insufficient streams or geographically remote availability of biowaste may make it difficult to build the business case; regulations that allow for the transport of biowaste to achieve economies of scale should be considered. ▪ Prefeasibility study determines likely business case that can be developed and used by private sector investors and in external investment promotion.

AG09 | Develop a long-term agriculture sector market development strategy and action plan (rationalizing and directing domestic consumption, export, imports)

Description
The agriculture sector should invest in water, land, and soil resources protection in order to achieve long-term sustainability. Although the sector consumes 52% of the country's water resources, the economic return on this water is quite low, and the overall rate of production is insufficient to sustain current food production for Jordan's domestic consumption and export markets. While the National Export Strategy (2014-2019) acknowledges the impact of water scarcity in principle, adequate measures have not been taken to organize agricultural production or to make it more water efficient.[79] Increasing agricultural production will require more environmental inputs, such as water to grow fruits and vegetables, and soils that can be used to sustainably grow fodder for livestock. If natural resource protection is not central to the sector's development strategy, the sector will not be able to deliver on its current growth potential. Trade relationships, agricultural production and agriculture sector governance are currently undertaken by three separate silos within the government/economy. Due to the challenging environmental and economic conditions facing Jordan, much more deliberate collaboration is needed to improve export orientation and market organization for the purpose of achieving sustainable growth. **The purpose of this action is to bring together national stakeholders in the government and private sector responsible for planning, cultivating, and marketing agricultural products, as well as those responsible for using, consuming or exporting agricultural products in order to improve the environmental and economic efficiency (and productivity) of the sector.** The project would not only lead to the development of a long-term trade and production strategy, but also the establishment of a national agriculture economy information system, that would help the government support efficient market development and conduct better, more evidence-based decision making and long term planning.

Action Objectives	▪ Institutionalize and regulate the export of agricultural products using standardized and efficient methods, and establish a market intelligence system to capture full knowledge of the requirements of foreign markets and the quantities, dates, and specifications needed by these markets. ▪ Increase the value added of agricultural products, their exports and enhances the importance of the agricultural sector within the national economy while at the same time benefiting investors, farmers, and exporters. ▪ Increase the proportion of Jordanian agricultural exports to European and Russian markets by 10% from the 2019 baseline.

Implementation Milestones	▪ **National agriculture export promotion committee** established to ensure robust transparency in the export market development and the stakeholder consultation process.
	▪ **One agricultural database** with key economic indicators and decision-making data developed and experts in government trained.
	  ▪ Provide necessary ICT infrastructure to manage the database, as well as training for government staff (from MoAg, Ministry of Foreign Affairs, Ministry of Industry and Trade, JIC, and the DOS).
	  ▪ Establish institutional channels through which the database can be populated.
	▪ **One set of agricultural export strategies** – one for each region of importance (Europe, Asia, Africa, etc.) – including environmental and social safeguards assessment for each export strategy.
	▪ **One set of policy and investment recommendations** developed for vocational training and skills development, industrial processing linkages, farmer protection, and price controls required to deliver on the strategy.

Relevant Green Growth Objectives	▪ **Sustainable Economic Growth** – Improve the quantity and quality of agricultural products sent to market (export and domestic). ▪ **Climate Change Adaptation and Mitigation** – Increase use of high-yield, drought and salinity-resistant plant varieties.

[79] The World Bank. Enabling the Business of Agriculture 2017. World Bank Group. Washington DC: World Bank, 2017.

Estimated Implementation Period	
Start Year – 2021	*End Year* – 2023

Location(s)	National	**Other key partners**	Netherlands Embassy, World Bank.
Implementing Stakeholders	*Lead* PM *Support* MOAg, JIC, MITS, MOPIC, DOS, MOFA JFU, JEPA	**Estimated Budget for this Action**	USD 2,000,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	EBRD, World Bank
Action leads to investment	☐ Yes ■ No ☐ This action is an Investment opportunity	**Estimated Investment Size**	-

Level of Priority			Readiness for Implementation				
Very High	High	Medium	1	2	3	4	5

Implementation Risk Mitigation Measures	▪ High-level leadership and alignment in approach among stakeholders is needed for the successful implementation of this program. ▪ Commitment to transparency, evidence-based decision making, and sustainable development are also critical to the successful implementation of this program. ▪ The formulation of a detailed program should be inclusive of private sector stakeholders, NGOs, research institutions, and subject matter experts to ensure strong buy-in to the final strategies developed.

AG10 | Upgrade packaging, scaling, storage and cooling of fruits and vegetables managed by the private sector

Description
Jordan has a great potential to improve revenues from fruit and vegetable exports. In addition to the many opportunities to grow them more efficiently, and to organize the markets to maximize profits and revenues through export orientation, infrastructure upgrades in the marketing phase are needed. **The purpose of this action is to mobilize investment in state-of-the-art sorting, packaging, and wholesale vending facilities for fruits and vegetables.**

Action Objectives	▪ Establish better understanding, through scientific research, of the specific regional and national needs to grow the revenues of Jordan export of fresh vegetables and fruits. This should be at value chain level, and should cover at least the needs to upgrade products' harvesting, temporary storage conditions, quality assurance, packaging, storage and cooling, transport, branding and marketing, etc. ▪ Improve quality control, food safety, and hygiene of fruits and vegetables grown in Jordan by increasing the quality and quantity of facilities to check the quality of products and its packaging, to properly scale, store and cool them. ▪ Achieve water and energy resource efficiency across all sorting, packaging, and wholesale vending facilities. ▪ Increasing the total amount of Jordanian exports of fresh vegetables and fruits sent to international markets.

Implementation Milestones	▪ **Infrastructure and training**
	  ▪ One baseline and assessment study of Jordan policies, regulations, systems, infrastructure, and operations related to the export of agricultural products and access to regional and international markets. This milestone should also include the identification and prioritization of strategic interventions needed to upgrade packaging, scaling, storage, and cooling of fruits and vegetables managed by the private sector, and to address investment barriers to the export of agri-products.
	  ▪ One pipeline of priority investments for upgrading packaging, scaling, storaging, and cooling facilities for fruits and vegetables, including recommendations for project formulation and financing options for public, private, and PPP projects' design.
	  ▪ Construction of six packaging and gradation units in the Jordan Valley and the highlands, located strategically to maximize proximity to production areas, reducing post-harvest losses.
	  ▪ One set of training modules developed for how to use the packaging and gradation technologies constructed.
	  ▪ One series of expert trainings provided to technicians in packing and gradation techniques.
	▪ **Private sector and market development**
	  ▪ Develop a sector modernization plan emphasizing joint economic work among private sector companies, adopting best practice and transfer of technology for packing, grading, and ground transport of fruits and vegetables.
	  ▪ Conduct a series of training courses to private sector facility owners and operators to align practices at the facilities to Good Agricultural Practices standards for fruits and vegetables.
	  ▪ Provide structured exploration visits to export markets facilitated by Jordanian trade representatives and business associations abroad.
	  ▪ Develop one mapping of transport routes from facilities to key market destinations, including recommendations for changes to enhance efficiency and market access, and reduce post-harvest loss during transport.
	▪ **Governance support**
	  ▪ One set of policy recommendations for how best to synchronize quality control and transport processes (inspection, certification, labelling, and packaging) with infrastructure upgrades.

Relevant Green Growth Objectives	▪ **Sustainable Economic Growth** – Improve the quantity and quality of agricultural products sent to market (export and domestic). ▪ **Resource Efficiency** - Increase use of resource efficient technology to reduce consumption and cost of water, energy, and waste management on farms and in agro-processing. ▪ **Social Development and Poverty Reduction** – Increase remunerative and socially inclusive rural employment by supporting vulnerable members of society to improve ecosystem integrity and create sustainable income generating opportunities.

Estimated Implementation Period	
Start Year — 2021	***End Year*** — 2023

Location(s)	National – Specific locations TBD	**Current Status**	FAO, JIC, NARC.
Implementing Stakeholders	***Lead*** MoAg, JEPA ***Support*** JFU, other private sector actors.	**Estimated Budget for this Action**	USD 3,000,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	World Bank, private sector
Action leads to investment	■ Yes ☐ No ☐ This action is an Investment opportunity	**Estimated Investment Size**	USD 12,200,000 (based on numbers provided by the MoAg)

Level of Priority			**Readiness for Implementation**				
Very High	High	Medium	1	2	3	4	5

Implementation Risk Mitigation Measures	▪ Enforceability of improved food safety and hygiene standards. ▪ Awareness raising of the importance of food safety and hygiene standards for domestic and overseas consumers.

AG11 | Promote the development of organic agriculture through knowledge exchange and market development

Description
Organic farming is not new to Jordan, but the market for certified organic products is still fledgling. This is because certified organic fertilizers are expensive (and must be imported, which is expensive) and because there is weak coordination among organic farmers, which limits the ability to achieve economies of scale. Organic farming has the potential to increase revenues for farmers, sometimes at little to no extra cost, but the key to marketing organic produce is the existence of a well-organized enforcement of the standards of organic produce. **Accordingly, the purpose of this action is to promote the market's development by learning about organic agriculture from regional and international experts, and supporting the development of the market by coordinating and including producers in the process of certification and marketing of organic produce.**

Action Objectives	▪ Exchange knowledge between public, private, and civil society stakeholders on the successes of Jordan's organic farming sector to date, as well as present the challenges and opportunities for organic farming in the 2020-2030 period. ▪ Increase awareness and access to extension services available for organic farming. ▪ Increase the number of farmers certified to sell organic fruits and vegetables.
Implementation Milestones	▪ **One program of knowledge sharing events** (workshops, media presentations, case studies, etc.) about the organic farming sector. ▪ **One training program developed and ToTs conducted for extension service agents** in the MoAg to provide guidance to farmers. ▪ **One feasibility study** to determine which international organic produce certifications should be pursued by Jordanian farmers, and how the standards can be benchmarked or mainstreamed into the national certification requirements of JSMO and MoAg. ▪ **A Roadmap for how best to proceed with organic agriculture in Jordan; and to establish a national, yet internationally accredited, certification system**, mapping the organic farmers who need support.
Relevant Green Growth Objectives	▪ **Social Development and Poverty Reduction** – Increase remunerative and socially inclusive rural employment by supporting vulnerable members of society to improve ecosystem integrity and create sustainable income generating opportunities. ▪ **Natural Capital** - Reduce air, soil, and water pollution resulting from agriculture and food production processes. ▪ **Sustainable Economic Growth** – Enhance the quantity and quality of public-private-civil society exchange regarding agriculture sector development.

Estimated Implementation Period	
Start Year – 2021	*End Year* – 2023

Location(s)	TBD	**Other key partners**	-
Implementing Stakeholders	*Lead* MoAg, Jordan Society for Organic Farming *Support* JSMO, Agriculture Credit Corporation, RSCN	**Estimated Budget for this Action**	USD 1,700,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	InvestBank
Action leads to investment	☐ Yes ■ No – Exchange of knowledge may lead to a clearer set of investment priorities ☐ This action is an Investment opportunity	**Estimated Investment Size**	-

Level of Priority			Readiness for Implementation				
Very High	High	Medium	1	2	3	4	5

Implementation Risk Mitigation Measures	▪ Different projects and organic certification systems are currently being run by different institutions – these should be harmonized in order to improve the export marketability of Jordan's organic produce. ▪ Deeper market assessments are needed to identify delivery service models, value-added potential, and domestic marketability of organic products.

AG12 | Establish an agricultural insurance company and develop agricultural risk mitigation strategy

Description
The purpose of this action is to establish a more effective mechanism for farmers to be protected from the impacts of climate change and other natural hazards. Currently, the government reimburses farmers for weather-related crop damage (equal to roughly 2 million JOD per year) through the ARMF. However, the establishment of an agricultural insurance company can more effectively address the issue of risk and damage, providing greater environmental and social benefits than a reimbursement-based system. The project is already under early implementation by stakeholders in NARC with funding from the Adaptation Fund (which is managed within MOPIC).

Action Objectives	▪ Increase the financial resilience of farmers and the economic resilience of the agriculture sector to climate change impacts. ▪ Improve the effectiveness of public funds used to promote climate change resilience and risk mitigation.

Implementation Milestones	▪ **Implementation of the findings of the feasibility study for the establishment of the "Solidarity Cooperative"** under the ARFM (funded by the Adaptation Fund program at MOPIC). This includes:
	  ▪ Development of an adaptation risk indicators database and systems to collect high quality data for use in insurance pricing and benefits/compensation.
	  ▪ Facilitation of the PPP in cooperation with PM and MoF.
	▪ **Awareness raising to farmers** about the costs and benefits associated with agricultural insurance.

Relevant Green Growth Objectives	▪ **Climate Change Adaptation and Mitigation** – Develop and implement policy measures that encourage the take-up of adaptive techniques and technologies. ▪ **Social Development and Poverty Reduction** - Reduce the impact of environmental or economic shocks on the most vulnerable members of society (particularly farmers and rural communities). ▪ **Sustainable Economic Growth** – Improve the quantity and quality of agricultural products sent to market (export and domestic).

Estimated Implementation Period	
Start Year — 2021	*End Year* — 2024+

Location(s)	National	**Other key partners**	ACC, JFU, Adaptation Fund (MOPIC)
Implementing Stakeholders	*Lead* ARFM, NARC *Support* MoAg, MoF (PPP Unit), MoEnv	**Estimated Budget for this Action**	USD 2,000,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	Adaptation Fund, Government Budget
Action leads to investment	■ Yes ☐ No ☐ This action is an Investment opportunity	**Estimated Investment Size**	USD 50,000,000 for the establishment and operation of the Solidarity Cooperative / insurance company

Level of Priority			Readiness for Implementation				
Very High	High	Medium	1	2	3	4	5

Implementation Risk Mitigation Measures	▪ Raise farmers' awareness of the benefits of taking out insurance. ▪ Feasibility study to focus on the commercial viability of the proposed Fund.

AG13 | Develop and Implement a National Afforestation Program in Jordan

Description

Jordan is a Mediterranean country that depends mostly on rain as its main water resource; but change in rainfall patterns and water availability as a result of climate change and unsustainable resource management, including land degradation and desertification, is already impacting the country. Although Jordan has made progress in raising support for conservation and protection, forests have not achieved their full potential rate of coverage, standing at less than 1.5% of the total land area. Forests have key ecological functions in preventing desertification and erosion, protecting watersheds, and providing sustainable natural resources. Jordan's forests in areas such as Dibeen and Ajloun Forest Reserves include both natural and plantation forests.

Jordan's environmental conditions make forest maintenance and development both a challenge and an opportunity. Many factors contribute to the degradation of Jordanian forests, including overgrazing, overexploitation, and forest clearing. These practices are causing a serious depletion in forests, because they lead to soil erosion, watershed destabilization microclimate changes. At the same time, the lack of forests is a permanent threat to sustainable soil and water management for agricultural use, due to the environmental degradation of upper watersheds. One major challenge is that fuelwood is illegally harvested at a faster rate than natural regeneration can support. Inadequate forest management and fire control exacerbate this problem. According to The National Biodiversity Strategy and Action Plan of Jordan 2015 – 2020, of Jordan's forest land, only 26% have forest cover with a canopy density of 10% or more, while the rest is mostly composed of land sparsely covered with vegetation[80]. The strategy has recommended afforestation activities in the areas that receive more than 250 mm/ year of rain, through rehabilitation of forests and creation of new manmade forests. Forest restoration has been successfully applied in Jordan, and a wealth of knowledge exists which can mobilize government, communities, and researchers to expand forest cover. Doing so can provide substantial ecosystem services, providing habitat for animals and plants (which can increase biodiversity), soil quality improvements, filtering of water, and carbon sequestration (to fight climate change). Forestry can also provide economic returns to local residents through tourism and recreation services – as it is the case in the northern area of Jordan, such as the Jordan Valley.

The purpose of this program is to develop and implement a set of Regional Afforestation Forums, bringing communities and the private sector together to identify the barriers, challenges, and investment opportunities to afforestation. The objective is to both increase the coverage and density of forests in Jordan while creating sustainable economic opportunities for communities.

Objectives	
	▪ Highlight afforestation as a national priority and develop a participatory approach to mobilize stakeholders. ▪ Reduced desertification through restoration of degraded ecosystems in rangelands and forests, and establishment of new man-made forests. ▪ Enhanced biodiversity and provision of ecosystem services. ▪ Enhanced awareness and involvement of all stakeholders, including communities, in landscape restoration and forest protection. ▪ Job opportunities created through the promotion of tourism, nursery management, and other income generating opportunities, particularly those for gender inclusion. ▪ Increased CO_2 sequestration capacity

[80] MoEnv. "The National Biodiversity Strategy and Action Plan of Jordan 2015 – 2020," n.d.

Implementation Milestones	▪ **Target setting and tree nursery development planning**
	  ▪ Technical study to explore all potential sites for the implementation of afforestation/ reforestation measures, considering multi-dimensional criteria such as environmental needs, community interest, land tenure, type of ecological zone, species (native, site-species matching), etc. Compare with international and regional best practice.
	  ▪ Develop an action plan for the rehabilitation and establishment of new nurseries, focused on community-based nursery development (involving training of local communities, local universities, NGOs and/or government extension services). Develop the required operations and maintenance manuals.
	  ▪ Build the capacity of the concerned staff, to improve their technical and managerial capabilities on how to run modern nurseries, and on creating linkages with agricultural R&D centers.
	  ▪ Implement the physical part of the rehabilitation and establishment.
	  ▪ Supervise the operations of the rehabilitated nurseries for 12 months.
	▪ **Set of business models for MSMEs developed**
	  ▪ Conduct an MSMEs mapping study to decide the exact number of micro and small business that can be created, as well as the location and nature of these businesses, defining which of those support women empowerment.
	  ▪ Carry out an outreach campaign based on the results of the mapping study.
	  ▪ Conduct a capacity building and consultation process with local community actors, business leaders, and enterprise development agencies, to discuss which forests to test, to decide on the best MSMEs that can be created within Jordan's forestry areas.
	  ▪ Support the implementation of the designed businesses. Partnerships between the government and communities shall be considered.
	▪ **Undertake plantation (estimated 10 million trees), mapping and conservation planning**
	  ▪ Design the forests, including the number of trees for each forest, as well as internal infrastructure including internal roads, water resources & irrigation networks if needed, as well as energy requirements (solar PV, etc.)
	  ▪ Create planting partnerships with CBOs, NGOs, Schools, Government (campaigns), Army, Cash for work programs, etc.
	  ▪ Develop a map for the existing and projected forests, presented under the national environmental map, and made available on national touristic maps.
	  ▪ Produce a webpage and a smart phone app based on the forests' maps, which can be used as a two-way communication channel between the ministry and communities, through which government can announce campaigns and developments regarding forests, while communities can use it as a whistleblowing tool, and a platform for sharing suggestions.
	▪ **Develop Forest Conservation Plan with Performance-based Incentives**
	  ▪ Design and Implement a maintenance and sustainability plan for at least 3 years (after planting), including the establishment of the necessary incentives and protection/ enforcement regimes.
	  ▪ Design Forest conservation plans for key forest landscape restoration areas – focusing on areas of unique biodiversity and watersheds.
	  ▪ Develop a bio-rights mechanism, where applicable, providing loans/micro-finance transitioning to grant systems (upon final delivery of a self-sustaining ecological service).
	  ▪ Identify technologies required for remote sensing and monitoring of forest depletion (to compliment the community-based approach).

Relevant Green Growth Objectives	▪ **Natural Capital** – Protect the area of forested land and increase the rate of afforestation and reforestation. ▪ **Social Development and Poverty Reduction** - Increase remunerative and socially inclusive rural employment by supporting vulnerable members of society to improve ecosystem integrity and create sustainable income generating opportunities. ▪ **Climate Change Adaptation and Mitigation** – Increase carbon sequestration capacity of Jordan's land and forest.

Estimated Implementation Period	
Start Year — 2021	*End Year* — 2025+

Location(s)	National wide	**Other key partners**	WFP, FAO, GGGI, UNDP
Implementing Stakeholders	*Lead* MoEnv *Support* MoAg, RSCN, local forest NGOs and nurseries.	**Estimated Budget for this Action**	USD 40 Million

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	EU, Government Budget
Action leads to investment	■ Yes ☐ No ☐ This action is an Investment opportunity		

Level of Priority			Readiness for Implementation				
Very High	High	Medium	1	2	3	4	5

- Forest Policy currently under revision and consideration by government; this policy is needed to help formulate investment targets and identify specific locations and techniques for implementation.

Implementation Risk Mitigation Measures	▪ Apply lessons learned from previous afforestation experience in Jordan. ▪ Raise awareness on the actual benefits that forests can bring to the community. ▪ Raise awareness on the role provided by forests in the face of a changing climate. ▪ Develop non-timber income streams for communities reliant on forests. ▪ Apply science and other success stories in designing the project. ▪ Design a proper financing mechanism to support project implementation.

AG14 | Support rural green growth and employment through ecosystems restoration

Description
In 2017, the World Future Council (WFC) awarded GoJ its "Future Policy Award" for its planned approach to address Badia's development through the holistic ecosystem regeneration of the "Hima" approach. This sustainable, integrated land management approach aims to reintroduce native plant and animal species, while emphasizing the significance of the relationship between local communities, the land, livestock, and water resources. Large-scale implementation of such an approach, and ownership by local communities and agriculture sector stakeholders may be an excellent way to achieve green growth in Jordan, with the potential to generate net economic benefits of EUR 172-347 million to Jordanian society, with a global carbon sequestration value of EUR 170–387 million.[81] Jordan has invested a substantial amount of funds in developing its largest land ecosystem, the rangelands, also known asBadia. However, the approaches taken have not been fully mainstreamed or sustained by local communities. These communities rely on the rangelands for grasses and harvested water, which are key inputs to the cultivation of livestock, one of the agriculture sector's largest sources of revenue (from both domestic consumption and export). At the same time, the MoAg spends a substantial amount of public resources on addressing rural poverty through encouraging agriculture. **The purpose of this action is to address the topic of rangeland restoration by incorporating ecosystems-based approaches into the economic development strategy of the MoAg.** The approach will divert some of the government's direct support for agriculture toward ecosystems restoration. Recipients will be provided training on ecosystems restoration approaches and be made aware of opportunities for sustainable livelihoods through ecosystems-based approaches. This will both maximize the use of government funds, while benefiting the communities in the rangelands – achieving sustainable economic growth and development through environmental protection.

Action Objectives	▪ Create an agricultural extension program targeted at training farmers, grazers, local communities, NGOs, and private sector to plan and implement local Badia restoration projects. ▪ Align and consolidate national donor funding intended to support Badia restoration and management, while also protecting livelihoods and increasing economic impact. ▪ Empower NGOs to support local communities with implementing ecosystems restoration approaches.

Implementation Milestones	▪ **Develop a national report on the state of the Badia**, and document traditional knowledge related to Badia's management and restoration.
	▪ **Update training modules** and deliver training to extension agents about the process for planning and implementing a holistic Badia restoration program in cooperation with local communities.
	▪ **Local Badia restoration partnerships** established between MoAg, NGOs, private sector actors and communities to plan restoration efforts.
	▪ **Up to three restoration plans developed that integrate:**
	  ▪ Water harvesting interventions;
	  ▪ Soil quality improvement interventions;
	  ▪ Native plant species introduction;
	  ▪ Drought tolerant crop farming and/or sustainable livestock management techniques;
	  ▪ Business models for value-added food production;
	  ▪ Community engagement and education plan; social and environmental safeguards plan.

Relevant Green Growth Objectives	▪ **Natural Capital** – Increase the restoration of degraded lands in the rangelands/Badia ecosystem. ▪ **Social Development and Poverty Reduction** - Increase remunerative and socially inclusive rural employment by supporting vulnerable members of society to improve ecosystem integrity and create sustainable income generating opportunities. ▪ **Climate Change Adaptation and Mitigation** – Increased use of high-yield, drought, and salinity-tolerant plant varieties.

[81] ELD Initiative. "Report for policy and decision makers: Reaping economic and environmental benefits from sustainable land management." 2015.

Estimated Implementation Period	
Start Year — 2021	*End Year* — 2024

Location(s)	TBD – three communities (one north, one middle, one south).	**Other key partners**	-
Implementing Stakeholders	*Lead* MoAg, MoEnv *Support* NARC, Local communities, NGOs.	**Estimated Budget for this Action**	USD 6,000,000

Financing Secured	☐ Yes ■ No	**Potential Source of Funding**	Mixture of donor funds and government funds for rural development/employment can be used to implement this action
Action leads to investment	☐ Yes ■ No ☐ This action is an Investment opportunity	**Estimated Investment Size**	-

Level of Priority			Readiness for Implementation				
Very High	High	Medium	1	2	3	4	5
▪ This is a new concept, although substantial national expertise exists on restoration approaches.							

Implementation Risk Mitigation Measures	▪ Awareness raising of the economic, environmental, and social significance of the Badia. ▪ Development of business models that support increased incomes for Badia dwellers.

ANNEX 1: Agriculture Sector Result Framework

The Green Growth Results Framework below was constructed with the support of the MoAg, DOS, and other national actors in accordance with international best practices in the field of green growth. This collection of indicators can be used to better understand the availability of green growth-related data in Jordan. The Government of Jordan is continuously striving to improve the quantity and quality of data for decision making in the area of sustainable development, and this framework will be continuously revisited and improved throughout the implementation phase.

Indicator	Definition	Baseline	Target	Responsible	Reporting and SDG	Timeline
Enhanced Natural Capital						
Total area and % area under organic farming	Area of organic farms (ha) AND Area of organic farms relative to total cultivated area	0.62% (1706 ha out of 273945 ha in 2014)	-	DOS MoAg	SDG 2.4.1 Proportion of agricultural area under productive and sustainable agriculture (C020401)	Annual Latest is 2017
Data Source DOS Environmental Statistics 2015-2014, table 1.2.1.4 and 1.2.1.2 MoAg, Organic Farming Division would have data prior to publication at DOS, but would need a special data request (not public)						
Total area and % area of rangeland reserves	-	-	-	MoAg	-	Rangeland Strategy for Jordan
Data Source Available through Rangeland Directorate but would need a special data request (not public)						
Sustainable Economic Growth						
Contribution of agriculture sector to GDP	Amount in JDs and %GDP contribution of "Agriculture, Hunting, Forestry and Fishing" sector relative to national GDP (at constant 1994 market prices)	3% (2017)	3.4% by 2025 2030 target to be set after sector actions are established	DOS	Vision 2025	Annual Latest is 2015
Data Source DOS Jordan Statistical Yearbook 2016, issue 67, table 23.11						
% workers in the agriculture sector (disaggregated)	% workers in the agriculture sector relative to total national labor force	1.62% (2017)	1.72% by 2025 2030 target to be set after sector actions are established	DOS	Vision 2025	Annual Latest is 2017
Data Source Data for "Agriculture, hunting, forestry and fishing", by quarter http://jorinfo.dos.gov.jo/PXWeb2014R2/Selection.aspx?px_tableid=EMP25&px_path=START__02__0205&px_language=en&px_db=DOS%20Database&rxid=e0c35eac-d04f-4689-ace3-8f29bf1f19da						

Indicator	Definition	Baseline	Target	Responsible	Reporting and SDG	Timeline
Social Development & Poverty Reduction						
% female workers in the sector	Total # female workers employed in the formal agriculture sector, relative to total employment in the sector	0.9% of total female employment (2017)	-	DOS	-	Annual Latest is 2017
Data Source http://www.dos.gov.jo/owa-user/owa/emp_unemp.show_tables1?lang=E&year1=2017&round=1&t_no=27						
% youth workers in the sector (disaggregated)	Total # youth workers (aged 15-24) employed in the agriculture sector, relative to total employment in the sector	TBD	-	DOS	-	Available annually, through special data request Latest is 2017
Data Source Will require dos special data request						
Resource Efficiency						
Area and % of agricultural land under drip irrigation	# acres of agricultural land under drip irrigation AND # acres of agricultural land under drip irrigation, relative to total irrigated area	925,000 acres (2017)	-	DOS	Vision 2025	Annual Latest is 2017
Data Source DOS Crop Statistics special data request for irrigation type						
Climate Change Adaptation and Mitigation						
Total national GHG emissions from the agriculture sector	Million metric tons of CO_2e emissions from the agriculture sector ($MtCO_2e$)	1.318 $MtCO_2e$ in 2006 (4.6 % of Jordan's total GHG emissions)	-	DOS/MoEnv	National Communication to United Nations Framework Convention on Climate Change (UNFCCC)	Will be annual once MoEnv has national inventory
Data Source DOS Environment Statistics 2015-2014 table 3.1.1.1						

ANNEX 2: Relations with National Agriculture Sector Development Strategy 2016-2025

The following table outlines the relationship between the National Agriculture Sector Development Strategy 2016-2025 and the Agriculture Sector Green Growth Action Plan, demonstrating substantial sector-level linkages with green growth. This table may not be exhaustive and there may be additional linkages that could be identified.

	Actions	National Agriculture Sector Development Strategy 2016-2025		
		Challenges and Barriers	Objectives/ Targets	Actions/measures proposed in strategy
AG01	Design and implement a capacity building program for evidence-based decision-making in the agriculture sector			▪ E.g. Develop a world-class level of expertise in agricultural trade negotiations ('Food Security Diplomacy' Skills) (p.10).
AG02	Support implementation of improved extension services	Inadequacy of the current extension programs and services noted.	Develop and improve the efficiency of agricultural extension services (p.25). Provision of adequate funding for extension programs (p.61).	▪ E.g. Support pest control efforts to reduce risks to farmers and disseminate information on best practices (p.10).
AG03	Map and optimize research to impact pathways to improve relevance of innovation efforts in the agriculture sector	Limited scope of R&D in several agricultural sub-sectors.	Supporting specialized applied agricultural research and knowledge transfer to workers in the sector Agriculture (p.11).	▪ E.g. Establish Bee research stations and labs in order to build the capacity of personnel in this sub-sector. ▪ Increase the scope of applied research for the expansion of fish farming.
AG04	Establish an agriculture sector modernization financing facility	Estimated a financing gap of approx. JOD 159M for modernization projects planned between 2016 and 2025.	Promote the use of modern technology in agriculture. Provide financing sources to increase the use of modern technologies in the sector.	▪ E.g. Establish an innovation fund for agriculture, food, energy, and water to stimulate development, adoption, and use of water-efficient technologies in Jordan (p.11).
AG05	Develop a flexible crop planning and variety selection methodology and decision-making process based on crop-per-drop and economic competitiveness		Diversify crop varieties and cropping pattern for increased adaptive capacity.	▪ E.g. Cultivation of high yield drought and salinity-resistant plant varieties.

	Actions	National Agriculture Sector Development Strategy 2016-2025		
		Challenges and Barriers	Objectives/ Targets	Actions/measures proposed in strategy
AG6	Implement program to support resource efficiency and circular economy in the olive cultivation and olive oil production sector	NA	Increase the productivity and quality of olive trees.	▪ E.g. Develop a project to reduce the environmental impacts of zibar (olive oil mill wastewater).
AG7	Develop pipeline of projects (all sizes) and policy recommendations to increase utilization of aquaponics and hydroponics in urban and rural areas	NA	NA	▪ E.g. Provision of interest-free financing for hydroponic systems (p. 90). ▪ Provision of unconventional sources of water for irrigation (whether grey, brackish, treated, etc.) (p.31).
AG8	Conduct national prefeasibility and market assessment to measure and leverage agriculture sector biowaste to resource potential	NA	NA	▪ E.g. Establishment of three factories for the treatment of municipal manure in the north, center and south of the Kingdom (for the provision of biological fertilizers to farmers and ensuring safe disposal of municipal manure). ▪ E.g. Increased command and control measures to prevent the use of untreated municipal fertilizers.
AG9	Develop a long-term agriculture sector market development strategy and action plan (covering domestic consumption, export, imports)	▪ Rising import competition in the local market. ▪ Poor price and quality competitiveness of domestic produce. ▪ Lack of marketing systems and supporting services for animal products. ▪ Increased marketing margins and price distortions due to unregulated and unmonitored auctions run in wholesale markets (p.49). ▪ Limited export access to higher income groups in traditional markets and expansion in European markets. ▪ Shipping 98.8% of all exports using land transport.	Protect the local produce against unfair import competition and the creation of anti-dumping actions.	▪ E.g. Develop long-term strategic arrangements with major global food producers to expand the diffusion of Jordanian agricultural produce into international markets (p.10). ▪ Build a database of domestic and export markets (p.51); Provision of investment incentives to establish companies dedicated for local and foreign marketing (p.51). ▪ Establish a company or a cooperative for marketing purposes (p.88). ▪ Attracting European agricultural investment projects whose production is to be destined for export to Europe (p.53).

	Actions	National Agriculture Sector Development Strategy 2016-2025		
		Challenges and Barriers	Objectives/ Targets	Actions/measures proposed in strategy
AG10	Upgrade sorting, packaging and wholesale vending facilities for fruits and vegetables to improve quality control	▪ Private sector's failure to invest in adequate infrastructure for marketing and exportation of agricultural commodities despite incentives (p.49). ▪ Lack of adequate sorting, packaging and wholesale vending facilities for fruits and vegetables in the local market (p.49). ▪ Lack of adequate marketing infrastructure; especially in livestock wholesale markets (p.54).	NA	▪ E.g. Provide incentives for the development and modernization of small-medium sized packaging and refrigeration facilities (p.11).
AG11	Promote the development of organic agriculture through knowledge exchange and market development	NA	▪ Increase the number of licensed organic farms from 54 farms in 2014 to 80 farms in 2025 (p.73). ▪ Encouraging organic agriculture for export purposes targeting 5% of existing Jordanian organic farms.	▪ E.g. Provision of incentives to producers investing in agricultural technology, organic farming, and water efficiency to increase their production (p.10).
AG12	Establish an agricultural insurance company through a public-private partnership (Adaptation Fund)	▪ The spread of pests especially transboundary pests and their growing impact on fruit and veg plantations. ▪ Absence of adequate agricultural insurance schemes due to increased risks of unforeseen agricultural hazards.	NA	▪ Create a national fund to reduce economic damages resulting from natural disasters.
AG13	Develop and implement a national afforestation program	▪ Degradation of biodiversity in forest lands due to exploitive human activity (p.36). ▪ Illegal logging and violations on the country's forest lands (p.36) - '111 forest violations registered in last third of 2016'.	NA	▪ E.g. Develop PPP models aimed at increasing private sector participation in management and operation of forest nurseries; Create synergies between forest ecosystems and human demands through payment for biodiversity services.

	Actions	National Agriculture Sector Development Strategy 2016-2025		
		Challenges and Barriers	Objectives/ Targets	Actions/measures proposed in strategy
AG14	Support rural green growth and employment through ecosystems restoration	▪ Increased illegal logging and violations on the country's rangelands (p.38). ▪ Degradation of biodiversity in rangelands due to exploitive human activity (p.38). ▪ Unregulated and excessive grazing leading to degradation of the vegetation cover (p.38). ▪ Elevated costs of improvement and rehabilitation of rangelands and lack of financing (p.38). ▪ Lack of coordination between public entities responsible for the conservation of rangelands (p.38)	Increase the income of famers in rural areas. Reduce overgrazing in Badia rangelands. Increase the vegetation cover in Badia Raise the production capacity of pasture lands;	▪ E.g. Contribution to poverty reduction in Badia and rural areas through provision of small agricultural soft loans. ▪ Develop cooperative rangeland management systems through increased community participation. ▪ Revival of the 'Huma' system for protected ecosystems through community-based sustainable grazing practices in drylands. ▪ Encourage the use of water harvesting methods for the development of rangelands in the Jordanian Badia.