

The National Strategy for Agricultural Development

2002-2010

Amman – 2003

I- Introduction

Upon the guidance and directions of His Majesty the King, and as part of the responsibilities assigned to it by the King, the Economic Advisory Council established an Agricultural Committee (AC) to prepare a National Strategy for Agricultural Development for the period 2000-2010.

The Committee started its work in June 2001. It formulated a work plan based on developing strategies for the agricultural subsectors that would form the basis for the preparation of the National Strategy for Agricultural Development. The AC established five specialized sub-sector committees for the preparation of the sub-sector strategies according to a unified methodology. An information committee was also established to provide the subcommittees with needed data and statistics.

The five sub-sectors committees are:

- 1- The committee for rain-fed agriculture.
- 2- The committee for irrigated agriculture in the Jordan Valley.
- 3- The committee for irrigated agriculture in the Highlands.
- 4- The committee for animal production and rangeland.
- 5- The committee for marketing of agricultural products.

Upon the request of the AC, the Ministry of Water and Irrigation (MoWI) prepared and submitted a comprehensive report on water resources and their current and projected use in Jordan. The report provided much of the information needed by the sub-sectors committees. The MoWI facilitated the work of the AC by providing venue offices for its meetings and by producing the draft strategy document.

The AC held general meetings to discuss the five sub-sector draft strategies and the report of the MoWI.

A Drafting Committee (DC), which was formed later from members of the AC and assisted by its chair, reviewed the sub-sector strategies and the report of the MoWI with the concerned committees before developing them in their final form.

Upon request of the DC, the sub-sectoral committees prepared summaries of the sub-sector strategies. These summaries were used for preparing the Agricultural Development Strategy in its pre-final form. The DC reviewed the proposed sub-sectoral development programs and projects for the purpose of eliminating duplication and/or overlapping. It also reviewed the measures and legislations proposed by the sub-sectoral committees and established priorities for programs and projects to be included in the Strategy Document.

Upon completing its review, the DC prepared and submitted the final draft strategy to the AC. The AC discussed the draft strategy, and, after making the requested changes, the DC completed the final document. The document was adopted in its final form following the incorporation of comments received from different parties.

The AC had the pleasure of submitting the document to the Economic Consultative Council, who had the honor of presenting it to His Majesty the King, who blessed it.

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II- Background

Agriculture was not expected to remain the most important sector in the national economy, as it has been since the 1950s. The nature of subsequent socio-economic development, which led to the rapid development of other sectors of the economy, especially services and industry, has resulted in a continued decline in the contribution of agriculture to the GDP. The contribution of Agriculture to the GDP, at current prices, has declined steadily from 14.4 percent in 1971, to 8.3 percent in 1975, to 7.1 percent in 1980, to 6 percent in 1995 and finally to 3.8 percent in 2000.

The decline has not been limited to its relative share in the GDP, but also in absolute value, which decreased, during the period 1991-2000, from about JD 223 million in 1991 to JD 178 million in 1995, and to JD 114.6 million in 2000.

While the decline in absolute values of the agricultural output during this period can be partially attributed to the occurrence of dry seasons, as the ratio of low rainfall to good rainfall years was 5:1, it also coincided with the implementation of a structural adjustment program, which included liberalization of trade in agricultural commodities, abolishing agricultural subsidies, reducing customs duties on agricultural imports, and eliminating non-customs trade barriers.

The gravity of this decline is measured not only in economic terms. Though economic development is the base for any integrated rural development and is the main generator of work and income opportunities in rural areas, there are two other, equally important measures to consider. The first is a compound social and political one related to the role of agriculture in slowing immigration from rural to urban areas, and of the associated rise in poverty and unemployment around and within urban areas. The second is an environmental measure related to the rational use of the natural resources—land, water, and natural vegetation—not just for direct economic benefits, but for the conservation of these resources and prevention of their degradation.

The decline in the contribution of agriculture to the national economy could be attributed to the following main reasons:

- Failure of government policies to provide a suitable enabling environment to encourage the private sector to invest in agriculture.

- Failure of the private sector to establish agribusiness projects, with appropriate economic size and structures and to build strong organizations that would enhance farmers' and stakeholders' role in agricultural development and in participation in shaping and implementing agricultural development policies.

- Failure of public and private institutions to support agricultural development. Cooperatives and farmer associations failed to solve farmers' economic and social problems. Moreover, universities and public institutions involved in research and technology transfer did not succeed in carrying out the duties assigned to them.

These factors resulted in a poor level of investment in agriculture and the absence of a comprehensive and integrated plan for agricultural development. Agricultural industry also did not receive adequate attention, in spite of its importance in maximizing the value added of agricultural products. Human resources in the rural areas as well, did not receive its share of rehabilitation, training, education, and health and social care.

The decline of the contribution of the agricultural sector to the GDP has caused some people to view the sector as a burden on the national economy. This negative attitude towards its development resulted in an approach that minimized investment in agriculture in favor of other sectors rather than one that focused on identifying problems and constraints for overcoming them, and enhancing the agricultural sector integration with the other sectors of the economy.

Insufficient and inaccurate data and statistics may have contributed to the development of this negative attitude towards agriculture, such as calculating the value of agricultural output at prices lower than market prices, which reduced the contribution of agricultural output to the GDP. For example, the average price of vegetables exported to the Arab Countries in 2000 was estimated at 170 fils/Kg and that of fruit at 190 fils/Kg, and that of vegetables and fruit exported to non-Arab countries at 330 fils/Kg. Live-sheep exported to the Gulf Countries in 2000 was estimated at JD 57 per animal.

Government policies seemed to have ignored the available opportunities for agricultural sector development, its contribution to the national economy, its significant role in social development, and in the protection of the environment.

Economically, the comparative advantage of the Ghor area, especially its early production season, has still not been fully exploited. National efforts in water harvesting that can provide additional water resources for irrigation are still modest. The promising Shafa-Ghor areas with suitable rainfall, ideal for the production of early fruits with minimum supplementary irrigation, are not yet fully exploited. The great potential for the development of natural rangeland has also been ignored in spite of the impact of such development on protecting natural resources and the environment, decreasing the imports of animal feed and in achieving the integration between plant and livestock production.

Socially, agriculture can significantly contribute to increasing income of rural families through involvement of women in income-generating activities, such as cottage farming, livestock production, and processing of agricultural products. Agricultural development creates job opportunities and provides additional sources of income for the rural population. This, in turn would help alleviate poverty and control migration from rural areas, thus sparing urban areas from additional pressures on their services, and the national economy the burden of creating more jobs.

Regarding environmental benefits, agriculture continues to play a crucial role in protecting land, water, and natural vegetation from deterioration, and in maintaining the productive capacity of these resources for sustainable development and protection of agro-biodiversity. Not less important, agriculture can mitigate the impacts of new environmental problems such as the increasing use of treated wastewater.

The declining role of agriculture in the national economy and the challenges that the sector will face, especially in light of trade liberalization, calls for a review of the agricultural development efforts to correct the current declining trends and avoid the dangerous negative effects of inaction.

There is an urgent need to develop a new and effective strategy for the development of the Agricultural Sector. Such a strategy should respond to the development needs in the rural areas, achieve a balance between the economic, social, and environmental dimensions of development, increase the economic returns and enhance social and economic equity through prioritizing public investment in rural areas, which had fewer opportunities for development in the past, while protecting and sustaining agricultural resources and fully integrating the agricultural sector with other sectors of the economy.

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III- The Role of the Agricultural Sector in Development

Agriculture is considered, in all countries, a basic pillar of economic and social development. During the past three decades, agriculture has also started to play a major role in the protection of the environment, including the protection of bio-diversity and ensuring an environmental balance that would secure sustainable use of resources and preserve them for future generations.

These principles have been used as a basis for agricultural strategies for many countries. Strategies no longer focus on the economic dimension of development alone, but emphasize the social and environmental dimensions as well. Developed countries have started allocating more resources to support the agricultural sector. Such support was about \$321 billion in the member countries of the Organization for Economic Cooperation and Development (OECD) in 2000, representing 32 percent of total value of agricultural output in these countries. The OECD countries continue this support regardless of the high cost entailed and associated problems at the level of trade, especially agricultural trade. The dispute among the developed countries on the issue of agricultural subsidies was a main impediment to WTO negotiations, and is considered clear evidence regarding the insistence of these countries to subsidize agriculture.

Jordan should not be an exception in its stand on the significance of agriculture and its role in development. To the contrary, due to its scarce resources, Jordan must give more attention to the development of agriculture in its economic, social and environmental aspects, and to deal with the agricultural sector on this multifaceted structure, which does not only consider economic returns, but the social and environmental benefits important for national security, environmental safety and public health.

The above considerations should not overshadow the need for economic efficiency in utilizing agricultural resources. Efforts must aim at building the agricultural economy on the basis of comparative advantage and competitiveness in price and quality, and at reducing subsidies and striking a balance in the use of natural resources for agricultural and non-agricultural uses.

As a developing country, Jordan needs to develop agriculture as the economic base for integrated rural development, through encouraging investment in the sector, creating job opportunities for rural people, providing raw material for agro-industries, and strengthening integrated economic links with other sectors of the economy. Jordan also should rely on agriculture to increase exports, to improve the level of self-reliance in food commodities, and to reduce the deficit in the agricultural trade balance. Agricultural development is also needed to help control migration from rural areas, conserve natural resources, protect the natural environment, and ensure sustainable development.

3-1 The Economic Dimension of Agricultural Development

The value of agricultural output, at current prices, has declined from JD 246.9 million in 1992 to JD 114.6 million in 2000. During the period a continued decline was observed in the contribution of agricultural output to the GDP from 11 percent in 1992 to 3.8 percent in 2000.

Food exports over the same period has exhibited large fluctuations in value. The lowest value was JD 86 million in 1991, while the highest was JD 181 million in 1997. This fluctuation also applies to the ratio of food export to total exports, reaching a minimum of 10 percent in 1995 and a maximum of 20% in 1993.

The value of imported food commodities has exhibited similar fluctuations, where it reached a minimum value of JD 409.7 million in 1994 and a maximum value of JD 685.9 million in 1996. The value of food imports as percentage of total imports exhibited a continuous decline from 24 percent in 1991 to 16 percent in 2000.

Food trade balance showed a continuous deficit with a minimum of JD 295 million in 1993, and a maximum of JD 525.8 in 1996.

The Agricultural Sector contributes to the creation of job opportunities. The number of employed agricultural labor increased from 41,000 in 1991 to about 68,000 in 1996 (31 percent Jordanians) and to about 114,000 in 2000 (55 percent Jordanians). Permanent agricultural labor is mainly concentrated in the JV areas, where it constitutes 60 percent of the total hand labour in the JV compared to only 9 percent in the Highlands, due to the nature and seasonality of production in the rainfed areas.

The Agricultural Sector started to witness declining growth rates during the late 1990s. This decline was attributed to the policy of trade liberalization adopted by the Government in 1994, and to the structural adjustment program of the agricultural sector (ASAL) in 2000. This trend increased with the implementation of measures related to Jordan's accession to the WTO, where measures undertaken for the protection of local production from external competition were abolished, except for a small percentage of custom duties on the import of certain commodities. Subsidies have been totally lifted and national agricultural products have had to compete with imported goods in the domestic and export markets. These developments coincided with a decline in the quality and quantity of water available for irrigation, which affected crop productivity and quality of produce and its competitiveness, in quality and price, in domestic and export markets. The fear is that these factors may deepen the declining trend in the agricultural sector output on the medium and long terms, and seriously affect the sustainability of social and economic development, unless measures are taken to address these problems.

Great attention therefore must be exerted by the Government to develop the agricultural sector in order to stop further deterioration and enhance its contribution to the national economy. This is especially important given that the agricultural sector, although declining, is still a key sector in generating activities for other sectors of the economy such as services and industries. Contribution of the agricultural sector and agri-businesses account for 27 percent of the GDP.

3-2 The Social Dimension of Agricultural Development

The most important social role of the agricultural sector lies in limiting migration from rural to urban areas.

Agriculture is the core of Jordan's rural-area development, as it is the main source of income for its inhabitants, and creates job opportunities and income generating activities in agriculture and related agribusiness activities. In a dynamic and progressive agriculture, rural people would not move to urban areas, thus avoiding pressure on city

services and creating poverty enclaves within urban surroundings, forcing the government and society to provide job opportunities.

Irrigated agriculture in the Highlands will help build stable societies in these areas, and by extension the nearby urbanized communities, through providing work opportunities in farming, animal production, and related supporting services.

Land-use planning, and dealing with tribal claims on land in the marginal areas are crucial in building societies based on agriculture in the Badia region. Integration between plant and livestock production will support the sustainability of the communities in these areas and their future development.

Agriculture development can effectively contribute to the integrated social and economic development in rural communities by involving community members in planning and implementing the development programs. Such participation will help build their readiness and assimilation in the developmental process, and promote the role of rural women in the social and economic activities of communities.

Finally, the development of agriculture would improve redistribution of the benefits of development in favor of rural people. The subsequent social and economic equity and justice attained through increased income of farmers and agricultural workers will improve their standard of living and provide them with new skills and knowledge that will enable them to effectively participate in the development efforts.

3-3 The Environmental Dimension of Agricultural Development

Agriculture affects the conservation of natural resources and their sustainable use more than any other sector.

Agricultural development is concerned with the conservation of natural resources and their rational use. If land and natural vegetation (forests and rangeland) are not utilized in a balanced and sustainable way, their properties and productive capabilities will deteriorate. Such degradation reduces their value as an economic resource, and results in an environmental imbalance that leads to non-sustainable development.

Agriculture has an important environmental role to play in conserving bio-diversity, natural vegetation, soil, water, flora, and fauna. The significance of this role is related to its major contributions to reduce the threats of both desertification and environmental degradation, and of land, water resources and biodiversity. Natural resources must be protected to provide the requirements for sustainable agricultural production in the long-term.

Due to the continuous increase in the amount of treated waste water, which is expected to reach 177 MCM in 2010, 219 MCM in 2015, and 246 MCM in 2020, agriculture is the only sector that is expected to accommodate the utilization of this type of water, through systems that ensure environmental safety and public health.

It is obvious that continued neglect of agriculture and reduced government support to its development will result in grave environmental consequences, especially regarding land and water. Degradation of natural resources may reach a level that is deemed too costly to reverse, if indeed it can be.

IV- Current Status of the Agricultural Sector

4-1 Changes in the Agricultural Sector since the Mid-Seventies

From the mid-seventies to the mid-eighties, the agricultural sector witnessed a remarkable development in irrigated agriculture. Irrigated areas and agricultural production increased in both the JV and the Highlands. A remarkable improvement was also observed in the productivity of agricultural resources due to the use of modern technologies and improved production methods in irrigated agriculture. Exports of fruit and vegetables, and live animals increased substantially as well. Production of poultry meat, table eggs and milk continued to increase. However, during the late eighties, the Jordan economy started to suffer from setbacks that prompted a structural adjustment program in 1989. The decelerating economic growth, combined with the negative impact of the second Gulf War, the introduction and implementation of trade liberalization policies and canceling of most of the subsidies previously provided for the agricultural sector, resulted in a progressive decline of the Sector's performance and its contribution to the GDP, as well as a loss of growth dynamics.

Factors contributing to these developments resulted from local and external causes. Locally an increased competition on agricultural resources (land and water) between the different economic sectors, which was coupled with a decline in interest in the AS compared to other sectors, a failure in linking production with market demand, which caused congestions through out the marketing channels; the weakness of agriculture research and extension programs, which were not enough to improve productivity and the near absence of effective farmers organizations were all contributing factors to decline. However, the two most important domestic changes were the implementation of a structural adjustment program, which started in 1989, and of an agricultural sector adjustment program, which started in 1994. These programs resulted in the liberalization of trade in agricultural commodities, opened the local market for imported agricultural commodities and eliminated most of agricultural subsidies.

Internationally, measures undertaken to liberalize the economy. Among such measures included accession to the WTO, signing of the Arab Free Trade Agreement and of the European-Jordanian Partnership Agreement. Although these agreements provide new opportunities to Jordan, they create challenges to local production that will require intensive efforts and substantial changes in the current policies, to overcome them.

The main changes that occurred in the agricultural sector between 1975-2000 can be summarized as follows:

4-1-1 Changes in the Availability of Natural Resources

Main changes were in the following areas:

i. Water Resources Available for Irrigation

The total amount of water available for irrigation in 1975 was 354 MCM, out of which, 178 MCM was surface water, 74 MCM was from springs, and 102 MCM was underground water. This amount increased to 557 MCM in 1998, which includes 225.6 MCM of surface water, 260.4 MCM of underground water, and 71 MCM of treated wastewater.

ii. Agricultural and Rangelands

The total area of surveyed and registered land, private and public, increased from about 14 million du in 1975 to 24 million du in 2000. Surveyed land included rangeland areas known as tribal claimed land. During this period, land available for cultivation decreased from about 3.9 million du in 1975, to 3.06 million du in 2000. Between 1975 and 2000 around 884 thousand du were no longer available for agriculture. Although there was a noticeable increase in the irrigated area, the rainfed agriculture has suffered from the loss of large areas of the best land, especially in areas bordering the municipal and village councils.

iii. Land Tenure

The number of registered Agricultural land holdings in 1975 was 50,791, with an area of 3.9 million du, of which 17,425 holdings were irrigated, with a total area of 330 thousand du, and 33,366 of rain-fed holdings, with a total area of 3.57 million du. By 1997, the total number of holdings increased to 113,316 and the total cropped area decreased to 2.87 million du, of which, 2.3 million du of rain-fed land, and 570 thousand du of irrigated lands. Between 1975 and 1997, the area of small-holdings (less than 5 du), increased by 19 percent, that of 5-10 du by 182 percent and that of 10-20 du by 101 percent. The three categories of holdings that suffered the most from fragmentation were those of 100-200 du which decreased by 42%, those of 200-500 du, which decreased by 48 percent, and those of 500-1000 du, which decreased by 43 percent.

iv. Employment in the Agricultural Sector

In the early 1960s, the agricultural sector provided work for about 33 percent of the total Jordanian labor force. Given the problems that the sector had suffered from, and the rapid development of other sectors of the economy, this percentage has dropped to about 18 percent of the total labor force during the seventies, to 10 percent during the eighties and only to 6 percent in the nineties.

4-1-2 Changes in Agricultural land Use Pattern

- During the period 1975-1997, the land area available for rainfed agriculture progressively decreased due to the irrational and (in most cases) unjustified expansion of the boundaries of municipal and village councils.
- There was an increase in the area planted with fruit trees. The largest increase was in the area planted with olives, especially under irrigation and in small holdings in the rain-fed areas, in which planting of field crops was no longer economically justified.
- There has been a continuous and tangible decrease in areas planted with grain legumes.
- Areas planted with wheat and barley fluctuated from year to year. There was however, a clear trend of a decline in the area planted with wheat and an increase in the area planted with barley, especially in marginal areas, not suitable for cereal production.
- The area cultivated with vegetables significantly increased due to increased irrigated areas outside the JV. The area cultivated with vegetables in rainfed areas, although small, continued to decrease.
- The area of rainfed land left uncultivated increased due to many factors, including the small size of holdings, land fragmentation and low revenue expected from field crops cultivation, and increase the areas of fallow-land. The average area of rainfed land left uncultivated including, fallow-land, is estimated at one million du annually.
- The irrigated area continued to increase, and advanced irrigation methods in both vegetables and fruit tree production was introduced.
- There has been a tangible effort deployed by farmers to reclaim rocky lands in the high rainfall areas for planting fruit trees.
- In spite of government efforts and enacted by-laws to protect the natural forests, the area of registered forest land has also declined due to forest abuse, exchanging forest land with other lands, and allocation for official and civil uses.

4-1-3 Changes in the Opportunities for Developing Land Resources

- Some initiatives were taken by farmers in reclaiming sloping lands that can be used for fruit trees after removing surface rocks, especially in high rainfall areas. Improved land-use methods, combined with water harvesting techniques helped in adding new lands under cultivation, which were mainly used for fruit trees or for high-value cash crops.
- The shortage of fresh water available for agriculture led to an increased use of treated wastewater, which if used in a proper and environmentally safe method, would provide opportunities to ensure production stability and decrease fluctuation resulting from seasonal and erratic rainfall, as well as shortages in the irrigation water supply.
- Land fragmentation and small size of holdings forced small farmers to introduce high-value cash crops suitable for such holdings, such as medicinal and herbal plants, that have an increasing market demand.

4-1-4 Changes in Institutional Structures, Legislation and Agricultural Services

- An Agricultural Marketing Organization (AMO) was established in 1987 and abolished in 2002. Its staff was transferred to the MoA.
- The Government approved by-laws allowing the division of lands owned by several parties, in areas outside the municipal and village boundaries and to the west of the railway, into units of 4 du (previously the minimum was ten

du). This has led to the fragmentation of agricultural land into small size holdings, too small to be efficiently used for the production of traditional field crops.

- A National Center for Agricultural Research and Technology Transfer (NCARTT) was established in 1994 to supervise, coordinate and implement applied agricultural research and technology transfer across the Kingdom.

- Policies and strategies were developed for desertification control, rangeland rehabilitation, agricultural sector development and bio-diversity conservation.

A special law for the protection of the environment was enacted (Law No.12 for 1995). The Ministry of Municipal and Rural Affairs and Environment (MMRAE) was mandated for its implementation. The Law includes several articles directly related to the protection of the environment in the agricultural sector, such as the conservation of the natural resources, combating desertification, protecting land from erosion and other issues. A council for the protection of the environment was established, chaired by MMRAE and comprising representatives of several concerned institutions.

- In 1996, a National Strategy for Agricultural Research and Technology Transfer was adopted, and in 1997 a strategy for agricultural extension was also adopted.

- In 1998, the MoA was restructured to accommodate new functions assigned to it by the Agricultural Adjustment Program. Restructuring included the definition of the MoA responsibilities and functions, focusing on planning, supervision and monitoring and follow-up functions. The restructuring involved merging of some directorates and the establishment of new directorates at headquarters and at the governorates level.

- A General Union of Jordanian Farmers (GUJF) was established in 1999, and the Jordan Valley Farmers Association was abolished. However, due to the weak organizational setup of the Union, the lack of sufficient financial resources, and a weak government support, the Union has been incapable of assuming a development role so far.

- A new law for the MoA has been prepared, consistent with the requirements of the Agricultural Structural Adjustment Program and those of the WTO.

4-1-5 Liberalization of Trade in Agricultural Commodities

Jordan has embarked on liberalizing its domestic and foreign trade since 1989, as part of the ongoing structural adjustment program. In 1993, Jordan applied for accession to the GATT, expressing its intention to be integrated into the international economy, and its readiness for more trade liberalization.

Liberalization of trade in agricultural commodities in Jordan started in 1994 as part of the Agricultural Structural Adjustment Program (ASTAP), and the Agriculture Structural Adjustment Loan (ASAL) provided by the World Bank. Jordan subsequently took numerous measures to liberalize its domestic and international trade in agricultural commodities, which centered around removal of direct subsidies and non-customs protection, reducing support to irrigation water, removal of feed subsidy, and abolishing the monopoly of the Agricultural Marketing and Processing Company (AMPCO) for importing fresh vegetables and fruit short on the market.

Means for subsidizing bread were reviewed and largely reduced. In May 1995, the Government removed quantitative restrictions on all imports. Pre-approvals for imports were stopped and customs duties on imports were reduced to a maximum of 30 percent.

In 1996, the Government adopted a comprehensive Agricultural Policy Charter prepared by the MoA. The charter aimed at achieving an integrated social and economic development while mitigating the impact of trade liberalizing in agricultural commodities.

In 1998, Jordan joined the Great Arab Free Trade Zone, which stipulates phasing out customs duties by 10 percent annually and completely canceling them by 2007.

In April 2000, Jordan signed the Jordan-EU Association Agreement, which provides for the establishment of a free trade area. The agreement provides facilities and exemption in customs duties on Jordanian exports of agricultural products. This agreement was implemented in May, 2002.

In May 2000, Jordan became a full member of the WTO. Thus, Jordan's local and foreign trade became subject to the provisions of the WTO agreements.

In 2001, Jordan signed the Free Trade Agreement (FTA) with the United States of America (USA). This agreement provides for a wide range of Jordanian agricultural products to enter the U.S market exempted from customs duties or at reduced rates.

Jordan also signed several bi-lateral trade agreements to establish free trade zones with some Arab countries.

The WTO agreement provides the general framework and basic principles that govern the liberalization of trade in agricultural commodities. Economic blocks, including the free trade zones, whether multilateral or bilateral, are established according to Article 24 of the GATT agreement 1994. In all of these agreements, the only purpose is to enable countries to exchange trade preferences and favors wider than those within the GATT scope, without obligation to other countries of the GATT, on the basis of the Most Favored Nation (GATT 1994, Article 1).

The main challenges of trade liberalization to the agricultural sector in Jordan can be summarized as follows:

- Opening the Jordanian markets for agricultural imports without any non-customs restrictions.

- Giving the same treatment, in the local market, for imported and local products without any discriminatory measures.

- Limiting the protection measures given to local produce to reduced customs' duties on imports. Unfortunately, Jordan agreed to the reduction of customs duties, requested by the World Bank in the SAP and entered the WTO negotiations with already reduced customs duties.
- Limiting the restricted local subsidy ceiling to 10 percent of the value of the agricultural output, on the condition that it is provided within certain forms. The non-restricted subsidy includes infrastructure, food subsidy programs, and agricultural development services including research, extension, training, information, studies and non-subsidized financing.
- Prohibiting exports subsidies except in very limited areas such as subsidizing internal transportation of exports.
- Enforcement of regulations to protect the domestic market from imports that do not comply with terms and technical rules of human, animal, and plant health, and enforcement of measures to protect the market from commercial fraud by being prepared technically, financially, and administratively to implement the agreements of TBT (Technical Barriers to Trade), and the Sanitary and Phytosanitary Measures (SPS).
- Protection of the local market from unfair competition reflected in harmful imports, subsidized imports, and dumping as well as false valuation of imported items to reduce customs duties. This protection is to be achieved by means of full readiness and good application of the agreements of Anti-Dumping Procedure (ADP), Compensation Fees (SCM), and Accurate Custom Valuation (ACV).

The free trade agreements among countries, whether multilateral or bi-lateral, will increase challenges to local products, while expanding the opportunity for export. The need to balance exports with imports is important, and Jordan should not enter into new free trade agreements unless it is certain that these agreements provide real export opportunities in exchange for facilities provided for imports.

4-2 Constraints on Sustained Agricultural Development

Sustainable agricultural development in Jordan faces problems that need to be addressed in the following areas:

4-2-1 Agricultural Resources

- Continuous decline in the area of productive agricultural land, due to the encroachment of urban activities on agricultural lands, in the absence of a law that regulates land use for different purposes throughout the Kingdom. Out of a total 3.8 million du of agricultural land, about 1.7 million du are located within municipal boundaries, most of which are in danger of being converted to non-agricultural uses.
- An increase in random construction outside urban planning zones, due to unenforced legislation regulating building on agricultural land. New urban centers evolve as a result and gradually grow into small, unplanned villages that create additional pressures on agricultural land and the environment.
- The fragmentation of agricultural land, converting larger parcels into small production units unsuitable for mechanized agriculture, resulted in leaving uncultivated large areas of land every year. The legislation passed by the government, allowing partitioning of land ownership outside municipal boundaries into smaller areas, have also contributed to the fragmentation of these ownerships and forcing them out of production.
- The poor management of rangelands, the destruction of plant cover, weakening of productive capacities of rangelands, and the allocation of about 10 million du of rangelands known as claimed tribal lands to private owners, without proper plans for their development and management as a natural resource. This facilitated its entrance into the real-estate business and its use for non-agricultural purposes.
- The deterioration of the rangeland's natural vegetation due to overgrazing, the absence of a national comprehensive and integrated plan for rangeland development, and the continued urban encroachment on forest lands.
- The fluctuation of rainfall from one season to another, and its irregular seasonal distribution, emergence of clear indicators of decreasing rainfall and an increase in the occurrence of periodical drought cycles as noted during the last three decades.
- A continuous decline in the quantity of fresh water available for agriculture, and the continued deterioration of its quality due to the increased rate of its mixing with treated wastewater of high salinity, especially in the middle Ghors, which has already resulted in increasing soil salinity, at a time when there are no adequate water resources to be used for soil leaching.
- Groundwater depletion resulting from over-pumping, and the decline in the quality of ground water due to this over-pumping and the pollution caused by wastewater seepage in some areas.
- Continued encroachment on forestland through uncontrolled grazing, illegal tree cutting, and using forestlands for government and civil uses.
- Shortage in rehabilitation and social care programs for the agricultural labor, which leads to an exodus from the agricultural sector to other sectors and the replacement by expatriate labor. Permanent agricultural workers are not included in the Labor Law or the Social Security Law, contrary to the labor force in all other economic sectors.

4-2-2 Agricultural Production

- Fluctuation in rain-fed agricultural production due to the fluctuation of the amount of rainfall from one season to another, and its irregular distribution within the season.
- Low productivity of rain-fed agriculture due to poor agricultural research, technology transfer and agricultural extension services addressing rainfed problems. Also crops are sometimes planted in unsuitable agro-ecological environments, such as growing cereals in marginal areas, wheat in low-rainfall areas suitable only for barley and

growing olive trees in heavy soils. This is aggravated by the low efficiency of production inputs, which is related to the weakness or lack of well trained human resources on modern production technologies.

- Continued low productivity in the livestock sector. It is estimated that the average mortality rate of calves in dairy cow farms is more than 20 percent, compared to 2-5 percent in developed countries and around 15 percent in broiler chicken farms, compared to 5-10 percent in developed countries.
- Unavailability or shortage in some of the production inputs (of high standards, dependable and accredited sources) in some production areas, such as the shortage in improved cereal seeds and in high quality fruit tree seedlings.
- Low competitiveness of products due to the small size of production enterprises, which prevents the benefits of economies of scale, and the limited use of modern technology for increasing the efficiency of production inputs and reducing production cost.
- Absence of plans for directing production to meet local market demand, and export and processing needs in terms of type of produce, varieties and timing of production, and the absence of contractual farming for export and processing purposes. This is due to the failure of the production system to interact with the marketing system and to achieve a link, in a frame of a mutual dependency relationship.
- Poor integration between plant and animal sectors, resulting in the decline of added value of their products.
- Poor rate of adoption of modern production technologies by farmers, due to poor agricultural extension and technology transfer services.
- Absence of producers organizations, such as councils and farmers commodity associations across the different production sectors, necessary to organize the producers, provide guidance for production, and facilitate organizational representation of producers through participation with the public sector, in planning development and policy formulation.

4-2-3 Marketing of Agricultural Products

- High marketing margins (between producer and consumer prices).
- Price instability.
- Weak links between supply and market demand.
- High percentage of lost and damaged goods at different marketing stages.
- Poor enabling environment for the private sector to play a leading role in the development of the marketing system.
- Small nature of the local market, making the marketing of products susceptible to regional markets and competition in the markets.
- Low price and quality competitiveness of local products.
- Inability of the present marketing system to increase exports to the traditional markets, and to enter new high-income markets.
- Failure of the marketing system to establish the production on contractual basis for commodities intended for export or processing.
- Increasing competition between imported and local agricultural products and the increasing competition in export markets, due to the adopted policy of free trade in agricultural commodities.
- Weak system for controlling produce quality and specifications, due to the existence of many control bodies, each with its own laboratories and control system.
- Weakness of the marketing infrastructure, especially in the area of wholesale markets of fruit and vegetables and live animals.

4-2-4 Agricultural Policies and Management of the Sector

- Previous government agricultural development plans were not comprehensive, lacked integration and the continuity needed to ensure stability and sustainability. This has led the Government to treat the symptoms of AS problems, rather than treating their causes. While identifying problems and treating the causes would provide steady progress, reduce their number and negative impact, predict their occurrence, and facilitate their monitoring and control. The contrary leads to short-term fixes, while the problems themselves remain unsolved.
- Lack of a strategic approach for natural resource use to formulate a plan for resource management, including protection from misuse, and deterioration, conversion to non-agricultural uses, and reduction of current and future threats.
- Previous agricultural policies did not cover all aspects of development, and lacked integration; these policies also lacked administrative structures and measures of implementation to ensure that their benefits reach the target groups, as well as systems of follow up and evaluation.
- Weak participation of the private sector in agricultural development planning, which is attributed to Government reluctance concerning PS participation, a shortage of professional and agribusiness organizations in the PS, and the limited effectiveness of those that do exist.
- Inadequate cooperation and coordination among government organizations involved in agricultural development, due to weak administrative and technical capacity and the absence of joint programs. This hinders integration and building on accomplishments and prevents these organizations from forming effective and lasting mechanisms for cooperation and coordination among them.
- Shortage in financial resources that prevent implementing some of the adopted policies and giving them the required strength, either in the area of infrastructure and support services, or in the area of direct internal policies, such as subsidies.

- Inadequate organization and structure of the national agricultural information system, data provided by the department of statistics differ from that of the MoA, in addition to inaccuracy of data provided in different areas (such as agricultural resources, production, marketing and international trade). This affects the ability of planners and decision makers to plan and make sound decisions.
- Ineffective agricultural research programs, methods of technology transfer, and agricultural extension and their impact on increasing production, improving produce quality and lowering costs of production.
- Insufficient government policies and programs regarding training and rehabilitation of agricultural workers. This hinders the introduction of modern farm management and production technologies, and impedes increased production efficiency.
- Limited role of the MoA in planning for the development of irrigation projects and in land use planning.

V- The Future of the Agricultural Sector

5-1 The Agricultural Sector in 2010 Assuming that the Current Trends of Agricultural Development will continue.

- The area of agricultural land will decrease (due to the irrational expansion of city and village boundaries to agricultural land and the absence of a law that defines land uses. This will have a direct negative impact on agricultural production and transform a growing number of agricultural producers to job seekers in urban centers, thereby creating social and environmental problems in urban areas.
- Maintaining the current rates of groundwater extraction, which exceed double the safe yield, will result in an accelerated drop in water table levels of groundwater basins, increased cost of pumping, and increasing water salinity (to the point that it may not be suitable for domestic use or unrestricted agricultural use). Continuing extraction at this level will ultimately cause groundwater depletion, loss of investments made in the irrigated agriculture in the highlands, and of other, related agribusinesses.
- Increasing the quantities of fresh water pumped from the King Abdullah Canal for municipal and industrial use outside the JV area and replacing it with treated wastewater of high salinity, will lead to increased soil salinity, deterioration of soil productivity and quality of produce, and a decreasing consumer confidence in Jordanian products.
- The increased ratio of treated wastewater in irrigation water will lead to limiting its use to restricted agriculture. This will result in losing an important agricultural area in the JV, important for its productive capacity and comparative advantage in the regional and international markets and of investments already made or planned these areas especially for enhancing agricultural exports.
- The economic reform policies and the Agricultural Structural Adjustment Program, which advocated abolishing subsidies on production inputs, trade liberalization, and opening the Jordanian market to agricultural imports (without taking advantage of measures provided by international agreements to encourage agricultural production in developing countries), will force increasing numbers of small farmers and livestock breeders to leave the sector and migrate to urban areas in search of work opportunities, increasing the problems of unemployment and poverty at the national level.
- The continued dependency of the present inadequate marketing system and the poor interaction and organizational relations between producers and consumers, will lead to the continued complaints of producers about the big difference between the prices they receive and consumer prices, laying the blame on the Government for not organizing and developing the marketing system. Agricultural producers will continue to complain about market congestion and material losses, and will pressure the government to provide them with support and subsidies through interventions which are either not allowed by international and regional agreements or that the government cannot provide permanently.
- The continued failure of the concerned government institutions to enforce the legal authority over Government-owned natural rangeland and to apply the legislations and instructions related to the protection and development of such lands, or the introduction of new legislations for communal rather than individual benefit, will result in the degradation of the rangeland and its productivity, increased desertification, and the deterioration of the socioeconomic standards of its inhabitants, who mainly depend on sheep and goat herding for their living.
- The limited attention given by the government to develop and build institutional capacity of the public sector will result in its failure to develop programs and projects, in critical areas such as in irrigation, research, agricultural extension, and marketing of agricultural produce. The lack of attention referred to above will also result in the failure of government organizations to promote mutual relationships with the agribusiness sectors supporting agricultural development and in the creation of a suitable environment to encourage the PS to invest in agriculture.
- Production of field crops will decrease in light of the decline in agricultural resources of arable lands and irrigation water. Furthermore, it will not be possible to maintain the current levels of production of these crops as long as the current policies concerning land use remain.
- Production of sheep and goat meat will decline due to the continued deterioration of the rangeland and the removal of feed subsidies. Local production of milk and poultry meat will also face severe competition from imports, which will be increasing in quantity, due to trade liberalization. This development may not only affect local production but may lead to the closure of some projects.

5-2 Future Outlook of the Agricultural Sector

5-2-1 The Future Vision for the Agricultural Sector by 2010

- Stable and sustainable agriculture in the JV based on advanced production technologies that maximize the return per unit of production (especially water), while protecting and developing agricultural resources and sustaining their productivity.
- A sustainable irrigated agriculture in the Highlands, within the limits of water resources available for irrigation, based on advanced production technologies that meet local market demand for fruits and vegetables and export opportunities for some types of fruits and cut flowers, where Jordan has a comparative advantage in the timing of their production.
- Agricultural production based on demand, with marketing infrastructure and organizations that are capable of meeting local and export market demand and agricultural industries in terms of quantity, quality, and price supported by adequate legislations and government support services.
- Strict management of water resources that ensure the quantity and quality of water allocated for irrigation during the period 2001 - 2010 to protect current and future investments in irrigated agriculture, and to plan production on this basis.
- Rain-fed agriculture that is based on improved, diversified and integrated agricultural cropping systems using modern technologies, and the expansion in the production of high-value cash crops, depending on family labor, that are appropriate for small agricultural land holdings in rainfed agriculture.
- Government adoption and application of national legislation and international agreements for the protection of agricultural resources from deterioration, preventing their misuse and ensuring the continuity of efforts required to maintain resource productivity, and improve their utilization.
- A stable organizational structure for the development of agriculture based on an organizational approach in planning and implementation, and investment policies to develop and enhance the scientific, technical, and administrative capabilities of government institutions, to enable them to introduce changes to meet new developments at the national, regional, and international levels, and the changing needs of agricultural development.
- A legislative, financial, and marketing infrastructure that provides a stable and suitable climate for the PS to invest in agriculture, and to take over some of the services currently provided by government organizations.
- An effective Agricultural Council that coordinates the efforts of the different government institutions, in setting agricultural policies and following up their implementation. This includes providing recommendations on suggested public investments, determining the uses of international grants, technical assistance, and loans for the agricultural sector, studying bilateral, regional, and international agreements, revising institutional legislations (laws, regulations, instructions, or decisions affecting agricultural development) and submitting such recommendations to the Council of Ministers.
- An agricultural sector that contributes to the protection of the natural environment and the agricultural resources (including soil, water and biodiversity), maintaining the cleanliness and beauty of the country-side, and surrounding residential settlements with prosperous agricultural areas.
- Farmers and PS organizations fully and effectively participating in the economic and social progress of the country.
- Government policy protecting the interests of all groups working in the agricultural sector, to achieve economic and social equity across the different economic sector, and support integrated development in rural areas.
- A stable government policy to develop and improve its programs in agricultural research and extension, marketing, and credit, as well as agricultural services, to facilitate the implementing the National Strategy for Agricultural Development (NSAD).
- A government policy that designates the agricultural sector as the basis for socio-economic development of the rural areas, including all that it takes to adopt policies for developing the needed infrastructure, supporting integrated agricultural and rural development, and intervening in distributing the benefits of development in favor of the rural people.
- A committed political will to implement the NSAD and government agencies capable of taking the required measures to implement the legislation and instruction approved by the government for protecting the environment and natural resources, specifically in the fields of preventing illegal extraction of groundwater; the rights in surface-water use and in preventing abuse of rangelands, forestlands, and protecting the environment.

5-3 The Main Objectives of the Agricultural Development Strategy

The NSAD aims to attain the following:

Economic Objectives

1. Provide a suitable environment for the private sector to effectively participate in agricultural development.
2. Increase investment in the agricultural sector.
3. Enhance integration between plant and animal production.
4. Provide new job opportunities and work in the agricultural sector.
5. Increase incomes of farmers and workers in the supporting agricultural activities.
6. Ensure economic equity between agriculture and others sectors of the economy and within the agricultural sector itself.
7. Increase productivity and decrease production costs.
8. Improve the competitiveness of produce in quality and price in local and export markets.
9. Increase agricultural production and increase its contribution to the GDP.

10. Increase the degree of self-reliance in food, and improve the agricultural trade balance.
11. Attain integration between the agricultural sector and the other economic sectors, especially in the area of processing of agricultural products.
12. Link domestic supply with market demand.
13. Develop farmer organizations and other private-sector groups working in the agricultural sector.

Social Objectives

- 1- Limit migration from rural areas into urban areas.
- 2- Increase women participation in agricultural development.
- 3- Enhance the capabilities of farmers and agricultural workers, and develop their knowledge base and abilities to effectively participate in the socioeconomic development of the rural areas.
- 4- Improve health, educational, social services, and living standards for rural people.

Environmental Objectives

- 1- Conserve land, water and natural vegetation, and utilize them within their production capacity to ensure sustainable and long-term agricultural production.
- 2- Conserve Jordan's biodiversity and utilize it in supporting agricultural development.
- 3- Improve the technical and managerial capabilities in the agricultural sector to cope with probable climate and environmental changes, and absorb their consequences.

Cooperation with Arab Countries Objective

- Achieve integration in agribusiness among Arab countries, including the establishment of joint projects for processing of agricultural procedure based on economic and social feasibility, and the extent they achieve integration between Jordan and neighboring Arab countries.

5-4 Assumptions upon which the Strategy is Based

The Agricultural Development Strategy was prepared assuming the following:

- 1- Government's full understanding and conviction of the key role the AS plays in development (in its economic, social, and environmental returns), and the strong political will to deal with the AS to act accordingly.
- 2- Jordan's potential for agricultural production is not used to its full extent, and the availability of unutilized potential and opportunities to achieve sustainable AD.
- 3- An average annual population growth of about 2.8 percent over the period 2001-2010, a 4 percent average growth for the GDP, and 3 percent for the consumption of food commodities.
- 4- Jordan will continue to face a water shortage and the traditional water resources that can be utilized will continue to fall short of future requirements, despite government efforts in this respect. Since priority of water use goes to municipal and industrial uses, the expected shortage will mostly be on the account of the AS, which will be increasingly depend on treated wastewater and non-traditional water resources.
- 5- Adjusting the prices of irrigation water to promote an efficient use of this scarce resource, without affecting the social and economic objectives of agricultural development in irrigated areas.
- 6- Government movement toward approving a general policy that controls urban expansion onto prime agricultural lands, especially in the highlands with high rainfall, and where the major population centers exist.
- 7- A decrease in the size of agricultural land ownerships in the highlands due to land fragmentation.
- 8- An increase in the area of agricultural holdings and farm units in the JV as a result of amendments included Jordan Valley Development Law, No. 30 for 2001 and expectation of establishing export-oriented agriculture in this area.
- 9- Expanded export opportunities of some high-value agricultural products, accompanied by the emergence of strong competition and challenges for Jordanian agricultural products in local and foreign markets, due to trade liberalization.
- 10- Government to provide suitable incentives and enabling environment for the PS to increase its investments in agriculture and in the provision of some services that the government will render to the PS and farmers organizations.
- 11- Government will provide all possible support to the AS within the provisions stipulated by regional and international agreements Jordan is committed to, and government commitment to encourage and provide incentives for exports, protect the local market from unjust competition and fraudulent trade practices in accordance with the stipulations of the WTO.
- 12- Priority of government development programs and services will be given to the least developed areas.
- 13- Government commitment to implementing the strategy in an integrated and comprehensive way, and to provide needed requirements for all stages of planning, financing, follow-up, to the stage of evaluation, to ensure successful implementation of the strategy.

The National Strategy for Agricultural Development

2002-2010

Amman – 2003

VI- Policies and Strategies for Subsectoral Developments

6-1 Rainfed Agriculture Sub-sector

6-1-1 Current Status

Rain-fed agriculture is concentrated in the highland regions where most of the Kingdom's population lives. It contributes to the incomes of around 80 thousand families, most of whom are of limited or low income, which means its role goes beyond the economic dimension to include the social and environmental arenas.

The area where rainfall exceeds 200 mm is around 8.1 million du, or about 9.1 percent of the land area of the Kingdom. This area includes the rain-fed agricultural areas and some irrigated and forest land. In 1997 the area available for rain-fed agriculture was 3.23 million du, of which only 2.2 million du were cultivated, while about one million du were left uncultivated or as fallow land. There are about 1.5 million du of sloping and rocky rain-fed land that is unsuitable for agricultural use in its current status, but can be reclaimed and used for agriculture especially for growing fruit-trees.

Rain-fed agriculture faces several problems that resulted in the deterioration of the land productivity and consequently its low contribution to agricultural output, and to the GDP. The decline of field crop production in rain-fed areas was accompanied by increased import of wheat, barley, lentils and chickpeas. It is anticipated that imported quantities of cereals and pulses will further increase with the increase in the population.

Rain-fed agriculture is characterized by low net returns of field crops due to the low productivity of land that depends on annual rainfall and its distribution, and to the growing of traditional field crops, which face stiff competition in the market due to the present policy of market liberalization.

The rain-fed fruit-tree sector also has been facing problems due to widespread pests, specially the Capnodes insect that destroyed large areas of stone fruit farms and the emerging marketing problems of olive oil, where production exceeded local consumption.

Under current agricultural policies, rain-fed agriculture is subjected to further decline due to several factors, most important of which are water scarcity, soil erosion, and land fragmentation. These problems will result in a number of negative outcomes including, a decrease in the area planted with field crops, (excluding barley that is increasingly cultivated in unsuitable, marginal lands), an expansion in growing olives in marginal unsuitable land depending on supplementary irrigation, olive oil marketing problems, the spread of insects infecting stone fruit trees, and a decline in economic returns of growing most of rain-fed crops.

6-1-2 Changes that Occurred in the Sub-sector

i. Fragmentation of Agricultural Land Ownership

Land available for rain-fed agriculture has suffered from fragmentation, especially around cities and urban centers. By-laws that allow division of land, increasing prices of land near urban centers and declining returns due to land misuse and erratic rainfall, contributed to this situation. Large areas have been left without cultivation (on average about 33 percent of total land area available for annual field crop cultivation). This has led to a change in the cropping pattern reflected in a growing tendency to shift from cultivating traditional field crops, not suitable for small holdings, to planting of fruit trees, especially olive trees.

ii. Crop Productivity

- Although some high yielding varieties of field crops and proper production technology packages are available, and that productivity per du on experimental farms using such technologies had improved, there has been no increase in productivity and total production at the national level, due to the low rate of adoption of the developed production packages and improved varieties, and to growing field crops in areas not suitable for agriculture.
- There has been some improvement in the productivity of fruit trees due to the improvement of agricultural practices, especially for olive trees.
- Many kinds of fruit trees, of unsuitable varieties and rootstocks for local environment, were introduced, such as peaches and some varieties of olive trees. This negatively affected their productivity and limited the area cultivated with these varieties.

iii. Development in the Use of Resources

- Several projects were implemented to improve the productivity of rain-fed lands through an integrated agricultural development of watersheds. Among such projects are the lower Zerqa basin, Wadi Hammad and Yarmouk Basin. This approach provided a better integration frame for the management of available resources.
- Efforts have recently started to utilize water-harvesting techniques in rain-fed farming, especially for growing fruit trees; these efforts are also aimed at protecting soil from erosion.
- Due to the increasing availability of treated wastewater, efforts have started to utilize this source for the production of forage crops. It is also expected to start using this resource for supplementary irrigation of fruit-trees during drought periods.

iv. Increasing Grain Imports

Imports of main field crops increased to meet local demand and compensate for the steady decline in local production. Imports of wheat, barley, lentils, and chickpeas increased from 495 thousand tons during the period of 1985-1989 to 1,145,000 tons, during the period of 1995-2000, or an increase of about 230 percent. The value of imports increased from JD 30 million during the first period to JD 135 million during the second period; (an increase of 350 percent).

v. Changing Cropping Patterns

- Due to the accelerating rate of agricultural land fragmentation, and the low net returns of field crops, many farmers have resorted to planting olive trees. This trend was enhanced by the suitability of local conditions to the growing of olive trees, the minimum production requirement, the inherited experience of population in the cultivation of olive trees and the expected demand for olive oil. This development has resulted in a large increase in the area planted with olive trees, most of which was planted in unsuitable lands and environments.

- The area cultivated with field crops decreased from over two million du in 1976-1978 to about 1.4 million du in 1996-1998; a decrease of about 31 percent. During these two periods, the areas cultivated with wheat declined by 66 percent with lentils by 80 percent, with chickpeas 23 percent and with remaining field crops by 77 percent. The area planted with barley increased by 83 percent due to the expansion of barley cultivation in the marginal lands at the expense of rangeland, mainly for purposes of confirming claims on land ownership. This led to severe degradation of the natural vegetation in these areas.

- An increase in the area planted with fruit-trees. Area planted fruit trees reached 540 thousand du in 2000, of which olive trees occupied 89 percent, followed by grapevine 4 %, apple trees 1.5 % and the remainder fruit trees 5.5 percent.

- Average economic returns from production of traditional crops remained low due to the dependence on annual rainfall. Traditional crops continue to face stiff competition in the local market due to the low prices of imported crops.

vi. Forestry and Natural Reserves

- Jordan has limited areas of natural and manmade forests, covering only 1 percent of the country's total area. In 2002 the area of natural forest, was 506000 du of which, 381000 du is government forests, and 127000 du are privately owned forests. The area of manmade forests is 450000 du.

- Despite the important role of forests in bio-diversity conservation, preventing soil erosion, recharging aquifers, and maintaining an environmental balance, this resource has not been treated as an important natural resource. Thus its contribution has been confined to providing firewood and contribution to local tourism.

- Areas covered with forest trees did not substantially increase despite continued efforts during several decades to plant forest lands. This was due to the continued encroachment on forests by farmers, or for construction purposes by governmental institutions, despite the availability of strong legislations for the protection of forests.

- The use of some private forests land has changed to fruit-tree cultivation without taking the necessary measures to protect the soil, which has contributed to a higher rate of soil erosion, soil deterioration, and to finally losing these areas as forests or productive lands.

- There has been increased interest in establishing reserves to protect forests and the forest ecosystem, resulting from global interest in biodiversity conservation. These reserves serve as a natural plant gene-bank, especially wild plants with potential medicinal uses and endangered species of plants, animals and birds. The number of established reserves forest reached six.

- Some forest areas serve as touristic and entertainment sites that can be expanded and developed for future environmental tourism.

6-1-3 Problems and Constraints

Rain-fed agriculture faces a number of problems and constraints that has led to the deterioration of resources, decreasing areas planted with field crops, poor investment, and low returns. These problems and constraints can be summarized as follows:

- Unplanned and accelerated urbanization activities have compromised agricultural land, especially in the high rainfall areas that resulted in the continued loss of large areas of fertile agricultural land for non-agricultural uses.
- The continued fragmentation of agricultural land into small holdings that are no longer suitable for traditional farming or for mechanized agriculture, resulted in low income of small farmers, and in their interest to cultivate these small holdings.
- Misuse of resources by applying improper agricultural practices, such as plowing in the direction of the slope, or using improper farm machinery.
- Planting crops in unsuitable environments, such as planting barley in marginal lands, wheat in areas suitable only for barley, and fruit trees in heavy clay soils, which resulted in the deterioration of land and natural vegetation, low productivity and net returns.
- Failure of the agricultural research system in finding proper solutions for problems facing highland farmers, such as drought-resistant varieties, introducing economically valid measures for conserving soil moisture and water harvesting, introducing and promoting high-value cash crops, as well as shortcomings in agricultural extension and technology transfer, in training of farmers on new technologies, and in encouraging them to properly use them.
- Unavailability of suitable and recommended agricultural inputs, especially seeds of improved field crops varieties and seedlings of fruit trees resistant to specific diseases.
- Inadequate credit programs for rain-fed agriculture.
- Outbreak of plant diseases affecting fruit trees especially stone fruits, which damaged many plantations.
- Lack of legislation regulating urban expansion on prime agricultural land and land fragmentation.
- Inadequate marketing of rain-fed agricultural produce and limited attention given to promoting the cultivation of high value crops for which local and export markets are available. This contributed to the low value of agricultural output and limited export opportunities.
- Insufficient governmental programs to support rain-fed sub-sector and to take advantage of concessions provided by the international agreements for the support of rainfed farmers.

6-1-4 Objectives of Policies and Strategies for the Development of Rainfed Sub-sector

1. Protect agricultural resources and improve their present use for sustained productivity.
2. Increase rain-fed cropped area by exploiting neglected areas and reclaiming new land.
3. Protect the environment and the agro-biodiversity and improve the quality of agricultural produce.
4. Increase the efficiency of rain-fed agriculture, maximize its economic returns, and increase its contribution to overall agricultural development.
5. Encourage crop diversification by introducing high-value cash crops and maximizing integration of plant and livestock production.
6. Promote production for agricultural processing and export to achieve integration and contribute to increase the added value of products.
7. Create job opportunities for rural populations, specifically women, to reduce unemployment and limit rural migration.
8. Reduce the risk facing rain-fed agriculture and its resources.

6-1-5 Strategies for Achieving the Objectives

Following is a summary of strategies to achieve the above objectives including programs, projects, and measures, (programs and projects are given in matrix shown in matrix No. 1-6).

Objective 1: Protect Resources and Improve their Present Use for Sustained Productivity.

Implementation Strategies:

- Complete the soil survey and classification project on a more detailed scale for areas with annual rainfall of more than 200 mm, giving priority to high rainfall areas (Program 1-Project 1).
- Implement a soil analysis program to determine the level of soil nutrients in order to formulate plans for maintaining soil fertility (Program 1-Project 2).
- Develop watershed areas based on integrated management systems, without affecting the quantities of water flowing into dams constructed for irrigation purposes; introduce water harvesting techniques (Program 1-Project 3).
- Introduce high value crops suited for small-holdings, such as medicinal and herbal plants and some kinds of fruit trees, to facilitate the re-introduction of small holdings in the agricultural production system (Program 11-Projects 1,2,3,4,5).
- Develop a unified national information database for agricultural resources, and develop a Geographic Information System to be used in planning the optimal use of land, and to monitor changes affecting agricultural resources (Program 14-Projects 1,2).
- Provide marketing services for products of rain-fed area by expanding demand for such products and guide farmers to grow crops with high demand in market (Program 16-Project 1).
- Adopt a regional planning approach to ensure balanced allocation of land for the different uses.
- Provide suitable incentives to encourage farmers to use land according to its productive capacity and protect it from degradation.
- Adopt a specific land-use policy that gives priority to protecting agricultural land.
- Control urban encroachment on agricultural land.
- Provide the required funds to implement land and resources programs that are not attractive to the PS.
- Train technical staff in land-use planning (Program 4-Project 4).
- Establish a system to ensure resource protection and development after project completion, and to make certain that beneficiaries of government-supported projects are committed to maintaining soil conservation measures.

Objective 2: Increase Rainfed Cropped Area by Exploiting Neglected Areas and Reclaiming New Areas.

Implementation Strategies:

- Complete the soil survey and classification project on a more detailed scale for areas with annual rainfall of more than 200 mm; identify areas which can be reclaimed and develop a program for their utilization according to their productive capacities. (Program 1-Project 1).
- Reclaim and develop rocky lands of annual rainfall of more than 200 mm, which have a sufficient soil cover that allows their use for agriculture (Program 3-Project 1, and Program 9 - Project 1).
- Reclaim lands suitable for agriculture in the Shafa-Ghor areas and implement soil conservation measures to prevent soil erosion (Program 2-Projects 1,3,5, Program 3-Project 1, and Program 7 -Project 1).
- Develop agricultural production systems for supplementary irrigation using treated wastewater, and its safe use (Program 8-Project 1).
- Develop forests by increasing the afforested area and increase forest productivity, through the application of modern management system, and establish additional natural reserves (Program 15-Projects 1,2, Program 2-Project 1).
- Provide suitable incentives for farmers to adopt, implement and maintain soil conservation measures, improve soil fertility, and grow crops according to land productive capacity.
- Provide the required funds for land reclamation activities and establish a mechanism to improve access of farmers and owners of lands in need of reclamation to benefit from ACC soft loans as part of an overall agricultural development program to reduce the land reclamation cost; ensure the use of reclaimed lands according to productive capacity, and prevent soil degradation.
- Implement water harvesting programs, especially in areas where treated wastewater is available for use in supplementary irrigation, to reduce the possible negative effects of using treated water alone (Program 14-Project 1).
- Develop a unified national database for land and water resources, to be used for long term planning and to monitor changes affecting these resources (Program 4-Projects 1,2).
- Establish pre-conditions and requirements for using marginal water (treated wastewater and brackish water) in agriculture, based on water quality, soil texture, climate, and purposes of use.

Objective 3: Protect the Environment, and Agro-biodiversity, and Improve the Quality of Agricultural Produce.

Implementation Strategies:

- Protect agro-biodiversity (plants and animals) and use of local land races for crop improvement, and apply international agreements in this respect (Program 2-Project 1).

- Benefit from the provision of the international agreements, including funding facilities and technical assistance to support biodiversity conservation, combating desertification, and protecting the environment.
- Provide effective extension services on the timing and means of using agricultural production inputs, including fertilizers and pesticides in producing medicinal and herbal plants, fruits and vegetables.
- Introduce organic farming for the production of vegetables, medicinal and herbal plants and olives in rain-fed areas, and develop a system to issue certificates for products of organic farming according to international standards (Program 11-Projects 1,2).
- Establish mechanisms for monitoring the use of chemicals, quality control of products and for issuing quality certificates according to international standards.

Objective 4: Increase the Efficiency of Rain-fed Agriculture, Maximize its Economic Returns and Increase its Contribution to Overall Agricultural Development.

Implementation Strategies:

- Improve the rate of farmer adoption of production technology packages, intensify agricultural extension activities, and ensure the availability of the required inputs needed to increase the productivity of the main field crops (Program 10-Project 1).
- Introduce high-value crops suitable for small and medium-size holdings that are suitable for processing, to increase their added value (Programs 11-Projects 1,2,3,4,5, Program 13-Project 1).
- Introduce the system of intercropping of barley with forage crops, bushes or cactus (in areas of rainfall between 200-250 mm) along with water harvesting measures to increase production of animal feed, and encourage animal husbandry (Program 12-Project 1).
- Promote the introduction of organic farming in the production of vegetables, medicinal and herbal plants and olives in rain-fed areas, and issue necessary regulations for issuing certificates for organic farming products according to international standards (Program 11-Projects 1,2).
- Promote planting of drought-tolerant fruit trees in reclaimed sloppy areas, such as olive trees, pistachio, and cactus (Program 9-Project 1, Program 13-Project 1).
- Provide marketing services for the products of rain-fed areas by guiding farmers to grow crops with high demand in the market, and by improving post-harvest operations (Program 6 - Project 1).
- Establish a mechanism to encourage the private sector to participate in the production of improved seeds and fruit tree seedlings, and develop a monitoring and control system to be applied by the concerned department at the MoA (Program 10-Project 2).
- Develop integrated pest management system for fruit tree farms.
- Train and qualify agricultural extension agents to provide timely information to target groups, and provide them with the means for carrying out their duties.
- Benefit from international agreements for supporting small poor farmers and the agriculture sector in general.

Objective 5: Encourage Crop Diversification by Introducing High Value Crops and Maximize Integration Between Plant and Livestock Production.

Implementation Strategies:

- Introduce a system of intercropping of barley with forage legumes, bushes or cactus, in areas with rainfall between 200-250 mm, accompanied with water harvesting measures to ensure the optimal and sustainable use of lands in these areas, increase production of animal feed, and encourage animal husbandry (Program 12-Project 1).
- Introduce high-value cash crops that are suitable for processing in small and medium size holdings (Program 11-Projects 1,2,3,4,5, Program 13 -Project 1).
- Diversify the cropping patterns, by testing and introducing crops for processing or export, and developing drought tolerant varieties.
- Provide incentives and soft loans for the implementation of small, income-generating agricultural projects at the family level.

Objective 6: Promote Production for Agricultural Processing and Export Purposes to Achieve Integration and Increase the Added Value of Products.

Implementation Strategies:

- Encourage the PS to invest in the production and processing of medicinal and herbal plants to raise the added value of the products and to provide new job opportunities in the rural areas.
- Identify markets for processed products and ensure fair distribution of returns among parties involved in the production and marketing (Program 6-Project 1).
- Improve the quality of olive oil to meet international standards and to enable competition in export markets (Program 9-Project 2, Program 6 - Project 1).

Objective 7: Create Job Opportunities for Rural Populations Specifically Women, to Reduce Unemployment and Limit Rural Migration.

Implementation Strategies:

- Provide incentives and soft loans for the implementation of small, income-generating agricultural projects at family level for supporting income of small farmers, using water harvesting techniques and family labor, and plant high-value cash crops, organic farming, and animal husbandry (Program 11-Projects 1,2,3,4,5).
- Promote processing of agricultural products such as freekeh (green dry wheat), and dairy products for increasing the added value of produce, and providing job opportunities for rural population.
- Implement programs for training of rural population, especially graduate youth and rural women, in organic farming, methods of production drying and storage of medicinal and herbal plants and in home-made dairy products.

Objective 8: Reduce the Risk Facing Rain-fed Agriculture and its Resources.

Implementation Strategies:

- Prepare a drought management strategy to deal with the impact of recurrent droughts on producers to reduce their economic, social, and environmental efforts, and to enable affected farmers to continue agricultural activities.
- Establish an “Agricultural Development Fund”, in line with the provisions provided under the “Green Fund Box” facilities of the WTO agreements, to provide needed support to farmers during emergencies and natural disasters.
- Develop a unified national database for land and water resources to be used for current and long term planning, and to monitor changes affecting these resources (Program 4-Projects 1,2).
- Monitor land use in rain-fed areas to ensure the application of policies approved for its management (Program 5-Projects 1,2, Program 1 - Projects 2,1,4).
- Conduct an environmental impact assessment of treated wastewater use in irrigation (Program 4-Projects 1,2, Program 5-Projects 1,2).
- Monitor deterioration of the natural resources, and prepare plans to stop it (Program 13-Projects 1,2, Program 5-Projects 1,2).
- Enact legislation that defines approaches and techniques to be applied for the collection of agricultural data and information, agencies mandated to collect them and the role of the different agencies in providing information.
- Adopt regional planning as the basis for allocating land for different uses, giving priority for the protection of arable lands and preventing their conversion to other uses.
- Intensify agricultural development efforts and services in the least developed rural areas.

1-6 Programs and Projects Matrix:

The following matrix summarizes the suggested programs and projects, highlighting the main projects components, including: justification, objectives, target area/groups, executing agency and partner organizations, duration, and implementation requirements.

Program 1: Assessment of Productive Capacities of Resources and Sustainability

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- Completion of soil survey and classification.

- Degradation of agricultural lands.

- Growing crops in unsuitable soils.
- Complete soil survey of promising agricultural land.
- Provide necessary information for development projects.
- Assess production potentials and land suitability for different uses.
- Areas with rainfall is higher than 200 mm.
 - MoA
 - RGC
- Five years
 - Secure required funds.
- Develop required work procedures.
- 2- Maintain soil fertility and soil nutrient levels.
 - Low land productivity.
 - Low farmers incomes.
 - Assess level of soil nutrients.
 - Determine appropriate crops to grow according to land suitability.
 - Maintain productive capacity of lands.
 - All rain-fed areas.
 - MoA
 - NCARTT
 - Extension Dept.
 - Universities
 - Farmers
 - PS
 - Eight years
 - Research programs.
 - Special extension programs.
 - Provide incentives to farmers.
- 3- Watershed development.
 - Scarcity of water resources.
 - Low efficiency in rainfall management.
 - Increase efficiency of rain water use.
 - Develop new farming systems to maximize output of agricultural resource.
 - Watersheds in rainfed areas with priority for areas with high rainfall.
 - MoA
 - MoWI
 - Universities
 - RGC
 - PS
 - Eight years
 - Securing funds.

- Training of farmers.

4- Train technical staff in land use planning.

- Insufficient trained staff in land use planning.
 - Land is not being used according to its production capacity.
 - Increase the number of trained staff to support planning capacities in land use.
 - Define basis of land use according to production capacity.
Technicians at the MoA, DLS, and municipalities.
 - MoA
 - Universities
 - RGC
- Three years
- Fellowships for technical staff to specialize in this area.
 - Training courses.

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Program 2: Bio-diversity Conservation

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Establishment of additional natural reserves.
 - Some wild species of plants and animals became endangered.
 - Disturbance of environmental balance.
 - Conserve animal and plant species.

Establish reserves at the following sites:

- Burqu'.
 - Wadi Rajeb.
 - Bayer.
 - Jarba.
 - Jebal Masa'dah.
 - Barqash.
 - MoA
 - MoEV
 - RSCN
 - NGOs
- Five years
- Approve a national plan to conserve bio-diversity.
 - Identify plant and wild animals species to be protected in the reserves.
 - Encourage local communities to assist in bio-diversity conservation.

Program 3: Reclamation of Rocky Lands

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Identification of promising steep and rocky areas and development of programs for their reclamation.
 - Rocky and steep areas are eroding.
 - Promising areas with land reclamation potential are disappearing.
 - Reclaim lands with high production potential.
 - Increase cultivated area.
 - Diversify agricultural systems.
 - Increase production.
 - Areas with annual rainfall exceeding 200 mm.
 - Slopy land.
 - MoA
 - MoP
- Ten years
- Establish a land-use system according to land classification.

- Provide required infrastructure.
- Provide incentives and assistance to land owners.

Program 4: Develop Database and Information Systems

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- Establishment of an agricultural information unit using geographic information system.

- Lack of a sound database for development planning.
 - Inaccuracy of available data.
 - Need to introduce information technologies that save time, efforts and reduce cost.
 - Improve follow-up and efficiency.
 - Save time, effort and cost.
 - Improve data quality.
 - Areas with annual rainfall exceeding 200 mm.
 - MoA
 - NCARTT
 - RGC
 - DOS
 - Universities
- Five years
- Develop procedures to be followed in data collection and analyses.

2- Establishment of a unified land resources information system.

- Inaccurate and non-comprehensive available data.
- Limited published information.
- Poor coordination between institutions concerned with information.
- Set specific standards for collecting data on environment.
- Establish a national information system.
- Coordinate work among concerned institutions.
- All rain-fed areas.
 - MoA
- DOS
- MoEV.

- NIC
- Universities
- LSD.
- MoP
- MoMRA
- Three years
- Establish organizational structure at MoA to be responsible for project implementation.

Program 5: Monitor Ec Changes

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Establishment of a system for monitoring natural vegetation and bio-diversity.
 - Lack of a national system for monitoring productivity of rain-fed areas.
 - Unavailability of bio-diversity maps.
 - Increasing number of endangered plant species.
 - The need for an early warning system on resource degradation.
 - Monitor productivity of agricultural rain-fed areas and of natural rangeland using modern techniques.
 - Produce bio-diversity and natural vegetation maps for the rain-fed area.
 - Establish an early warning system for mitigating anticipated resource degradation.
 - Reestablish endangered plant species.
- Rain-fed areas and rangeland.
- MoA
 - Universities
 - MoEV
 - RSCN
 - RGC
- Continuous
- Enact land-use legislation defining crops to be grown in various areas, proper agricultural practices to be followed and suitable implementation tools.
 - Institutional framework with defined responsibilities.
- 2- Classification of priorities for mitigating environmental deterioration.
 - Varied threats that may cause environmental deterioration ..
 - Lack of a list of priority projects for mitigating the environmental deterioration.
 - Establish a priority list for protecting land productivity and deterioration of the environment.

- Establish productivity and environmental indicators to define methods of resource conservation.
- Integrate sound management practices with production practices.
Areas with rainfall exceeds 200 mm.
 - MoA
 - MoP
 - MoMRA
 - Universities
Three years
 - Coordinate efforts and collect data.
- Set basis and standards for evaluation.
- Identify deterioration priority according to established standards.

Program 6: Development of Marketing Services

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Development of field crops marketing system.
 - Low net returns from rain-fed agriculture.
 - Large losses and waste of produce.
 - Poor market negotiation capacity of farmers.
 - Lack of relevant market information for producers to plan production.
 - Increase revenues of producers.
 - Expand market demand.
 - Ensure fair distribution of benefits among marketing parties.
 - Maximize value added of products.
 - Create job opportunities for rural people.
Farmers producing wheat, barley, lentils and chickpeas.
 - MoA
 - ACC
 - NCARTT
 - DOS
 - AE
 - FGA

- Producers

Five years

- Exempt production inputs and equipment from taxes and duties.
- Support pest control programs.
- Establish an organizational structure for providing needed support services.

Program 7: Watersheds Management in the Ghor-Highland Areas

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Implementation of soil protection measures.
 - Increasing rates of soil erosion.
 - Loss of cultivable land.
 - Low land-productivity.
 - Low efficiency of water harvesting measures.
 - Control soil erosion.
 - Maintain productivity of land.
 - Introduce new crops following the improvement in soil moisture.
- Rain-fed areas located between JV and the Highlands.
- MoA
 - MoP
- Five years
- Secure required funds to implement conservation measures.
 - Construct infrastructure for soil conservation.
 - Establish simple, practical models for agricultural development in watersheds.
 - Identify proper water harvesting techniques to be used.

Program 8: Use of Treated Wastewater in Supplementary Irrigation

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Use of treated wastewater in supplementary irrigation.
 - Increasing quantities of treated wastewater.
 - The necessity of using this water in agriculture without producing an adverse impact on the environment and the resources.
 - Scarcity of fresh water resources.
 - The need of most of fruit trees in the Highlands for supplementary irrigation under certain conditions.
 - Ensure stability in the production.
 - Improve fruit tree production.
 - Produce oil crops or timber.
 - Use treated wastewater in a way that reduces negative environmental impacts.
 - Areas surrounding the wastewater treatment plants.
 - MoA
 - MoWI
 - MoP
 - MoH
 - Seven years
 - Set standards for wastewater quality.
 - Identify crops that could be grown using this water.
 - Identify areas where this water will be used.
 - Review environmental and public health hazards and relevant legislation.

Program 9: Development of the Olive Sector

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Development of olive production.
 - Low productivity of olive trees.
 - Planting olive trees in unsuitable environments.
 - Unavailability of good seedlings in sufficient quantities.
 - Increase production per unit area.
 - Decrease fluctuation in production from year to year.
 - Produce good seedlings.
 - Improve the quality of produce.

Rain-fed areas.

- MoA
- NCARTT
- Universities
- AE

- FGA
Five Years

- Establish a government institution or a cooperative for the development of olive production in Jordan.
- Develop production management programs (planting, management, fertilization, and pest control).

2- Development of olive oil marketing.

- Unstable local price .
- Available opportunities to improve quality.
- Promising export markets.
- Promote local consumption of Jordanian olive oil.
- Qualify olive oil for export.
- Improve and stabilize prices.

Olive and olive oil producers in Jordan.

- MoA
- PS
- JISM
- ACC
- Olive Press Owners Association
- MoI
- Investment Promotion Corp.
- Universities
- MoFA
- NCARTT

- FGA
Five years

- Transfer research outputs to farmers.
- Intensify extension service in the areas of picking of fruits, processing, packing and storage of oil.

Program 10: Improvement of Rainfed Agricultural Systems and Increasing Productivity of Field Crops

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- National campaign for the application of field crop production technologies.

- Low productivity.
- High cost of production.
- Increase in the percentage of neglected rain-fed areas and fallow lands.
 - Increase production per unit area.
- Plant crops in their suitable environments.
- Increase area planted with field crops.

Farmers in rain-fed areas.

- MoA
 - NCARTT
 - Ext. D.
 - ACC
 - FGA
 - PS
- Three years
- Intensive and organized extension efforts.
 - Develop new varieties suitable for the various agro-ecological zones.
 - Activate and complete scientific research on mechanized harvesting of grain legumes.
 - Government to purchase the produce at fair and encouraging prices.
- 2- Seed multiplication of improved varieties.
- Seeds of improved varieties are not available in sufficient quantities to farmers.

- The need to produce seeds of varieties suitable to different agro-ecological zones of Jordan.
- Provide farmers with improved and certified seeds.
- Seed multiplication of developed improved varieties.
- Use of crop varieties adapted to local conditions.
- Farmers in rain-fed areas.
 - MoA
 - NCARTT
 - ACC
 - Ext. D.
 - PS
- Five years
 - Adopt a stable and realistic policy in this field.
- Conduct research to devise crop varieties adapted to the various agro-ecological zones in the rainfed areas.

Program 11: Optimal Use of Small Holdings

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Introduction of medicinal and herbal plants in the cropping system.
 - Poor level of diversification in the agricultural production systems.
 - Low net return per unit area from traditional crops.
 - Increasing number of small-size holdings due to land fragmentation.
 - Increasing area of small-size holdings not cultivated.
 - High economic returns from cultivating medicinal and herbal plants.
 - Diversify agricultural production systems.
 - Increase net return per unit area.
 - Produce crops that are competitive in export market.
 - Exploit small-holdings.
 - Create new job opportunities at farm level.
 - Areas with annual rainfall of 300 mm and above.
 - Small holdings.

- MoA
- NCARTT
- Ext. D.
- ACC
- JISM
- PS
- Production Input companies
Five years
 - Provide soft loans for production, processing and export of products.
 - Conduct needed research and develop the methods of technology transfer.
 - Provide production inputs.

- 2- Organic farming for summer vegetables.
 - Increasing demand for this type of agriculture.
 - Potential for organic farming.
 - Protection of environment and public health.
 - Expand the cultivation of summer rain-fed vegetables.
 - Improve the quality of produce.
 - Increase farmer's income.
 - Create new job opportunities.
 - Areas where rainfall exceeds 350 mm.
 - MoA
 - NCARTT
 - Ext. D.
Five years
 - Research and extension.
 - Promotion campaign for healthy products.
 - Suitable marketing mechanism.

- 3- Promotion of grapevines cultivation.
 - Grapevines are common crops in many areas of the Highlands.
 - Suitable agro-ecological conditions are available to expand grape cultivation.
 - Low productivity of present orchards.
 - Encouraging farmers to establish water-harvesting systems.

- Better use of land resources.
 - Introduce water-harvesting techniques at farm level.
 - Increase productivity and improve product quality.
 - Increase farmer incomes.
 - Areas where rainfall exceed 500 mm
 - MoA
 - NCARTT
 - ACC
 - Ext. D.
 - Universities
 - FGA
- Five years
- Evaluate the productivity of types and varieties in use in Jordan and select those for use in the project.
 - Develop suitable training programs for farmers.
 - Introduce suitable farm management programs relevant for rainfed agriculture.
 - Establish nurseries for the supply of certified seedlings of selected varieties.
- 4- Development of Freekeh production from durum wheat
- Increasing import of “freekeh”.
 - Local product is short of local demand.
 - Low quality of local product.
 - The need to increase the value added of wheat.
 - Mechanize freekeh production to obtain high quality product.
 - Meet the local market need and that of some export markets.
 - Increase the value-added and increase farmer income.
 - Wheat growing areas with rainfall exceeding 300mm.
 - MoA
 - NCARTT
 - FGA
 - Universities
- Seven years
- Select proper varieties.
 - Mechanization of Freekeh production.
- 5- Promotion of sweet almond cultivation (family projects).
- Poor families need to develop productive projects than depend on family labor.
 - The need for improving incomes of poor families.
 - Relevance of the project for rural women participation.

- Encourage the exploitation of small-holdings.
- Reduce imports.
- Increase farmer income.
- Involve rural women in agricultural activities at farm level.
- Rain-fed areas with rainfall between 400-500 mm.
- Small-holdings.
 - MoA
- NCARTT
- AE
- ACC
- Universities
- FGA
 - Five years
 - Provide good seedlings of suitable varieties.
- Provide specialized agricultural extension service.

Program 12: Intercropping Barley with Fodder Shrubs and Cactus

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Intercropping barley with forage shrubs and cactus.
 - Increasing demand on animal feed.
 - Import of large quantities of feed.
 - Poor integration between plant and animal production
 - Available opportunities to use this production system in exploiting areas in rain-fed areas with 200-250mm of rainfall.
 - Increase local production of animal feed.
 - Improve the agricultural production system in targeted areas.
 - Promote plant and livestock integration.
 - Better utilization of rainwater through water harvesting.
 - Increase rural female participation in agricultural activities.
 - Areas close to marginal land with 200-250 mm rain.
 - Farmer owners of livestock.
 - MoA
 - NCARTT

- ACC.
- Universities
- AE
- ACC
- FGA
- PS

Five years

- Choice of suitable varieties.
- Use of water harvesting techniques.
- Development of feeding systems for animals using fodder shrubs and cactus.

Program 13: Promotion of Pistachio Cultivation

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Promotion of pistachio cultivation.
 - Suitability for small -holdings.
 - Local production short of local market demand.
 - Availability of suitable areas for the production.
 - Crop diversification.
 - Meet demand of local market.
 - Introduce water-harvesting techniques.
 - Farmers in the Highland areas with annual rainfall of 300mm and above.
 -
 - MoA
 - NCARTT
 - AE
 - Universities
 - NGOs
- Ten years
- Secure suitable seeds and seedlings.
 - Develop new methods that accelerate fruition of trees.

Program 14: Develop Production Systems in Areas that Depend on Water Harvesting and Treated Wastewater

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- Develop agricultural systems within watersheds.

- Fluctuating rainfall limits sustained land use.
- Low efficiency in using water resources.
- Increasing environmental risks due to expected increasing use of treated wastewater in agriculture.
- The need to develop agricultural systems suitable for different environments.
- Improve water use efficiency.
- Improve land productivity.
- Diversify agricultural production system.
- Increase level of integration between livestock and plant production systems.
- Reduce unemployment.
- Diversify sources of income.
- Assure environmentally safe use of treated wastewater.
- Farms near treatment plants

- MoA

- MoP

- MoWI

Five years

- Set standards and specifications for treated wastewater use in agriculture.
- Issue regulations to define types of land that can be irrigated with wastewater.
- Specify crops to be cultivated according to this regulations.

Program 15: Forests Development

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Improvement of forest management through the application of advanced technologies.

- Poor level of forest management.
- Availability of new technologies for improvement of forest management.
- Readiness of international agencies to provide technical and financial assistance.
- Fear of environmental deterioration.
- Introduce advanced techniques in management.
- Train staff to use these techniques.
 - Forests areas.
 - MoA
- Forest Dept.

Three years

- Staff training.
- 2- Improvement of forest nurseries production
- Shortage in forest seedlings of needed species.
 - The need to produce seedlings of rare and endangered local types of forest trees.
 - Produce seedlings suitable for planting in different environments.
 - Use of modern techniques in seedling production.
 - Introduce advanced methods of irrigation in forest nurseries.
 - Government forest nurseries.
 - MoA
 - Forestry Dept.

The National Strategy for Agricultural Development

2002-2010

Amman – 2003

6-3 Irrigated Agriculture in the Jordan Valley

6-3-1 Current Status

The Jordan Valley area (JV), as stipulated in the Jordan Valley Development Law No. (30) for 2001, includes the Ghors north and south of the Dead Sea and Wadi Araba north of Qatar village. It is the most important agricultural area in Jordan and is the main source of vegetables and fruit during the winter. It is also a promising area for mining industries based on the extraction and processing of Dead Sea salts, for medical treatment and for religious tourism.

Agricultural development in JV started in 1950s, by the implementation of the Zarka Triangle Irrigation Project and the establishment of Deir Alla Agricultural Research Station. In 1973, the Jordan Valley Commission (JVC) was established with financial and administrative autonomy. It was endowed with a wide scope of responsibility to implement comprehensive socio-economic development of the JV based on irrigated agriculture. In 1977, the JVC was replaced by the Jordan Valley Authority (JVA), which now operates under the umbrella of MoWI.

The basic infrastructure for irrigating about 360 thousand du in the Ghors north and south of the Dead Sea was completed during the last three decades. This area is a part of 427[1] thousand du of arable land to be developed by the year 2020, including, 363000 du in the Ghors north of Dead Sea, and 64000 du in the Southern Ghors, and Wadi Araba where 25,000 du will be developed by 2005. The development of the remaining arable land will be completed by 2010.

The agricultural development plan for the JV is based on the possibility of supply of about 386 MCM of water for irrigation in 2005, 465 MCM in 2010, and 428 MCM in 2020. Water supply is to be achieved through the construction of new irrigation projects and the use of increasing quantities of treated wastewater, which will increase from 60 MCM at present, to 63 MCM in 2005, 107 MCM in 2010, and about 144 MCM in 2020. The anticipated amount of treated wastewater to be used by then in irrigation will constitute about 33.5 percent of total amount of available irrigation water in the JV compared with 23.5 percent in 1998.

Available data indicates that the cropped area in the JV decreased in 2000 to about 291000 du, compared with 315000 du in 1997. The decline was due to drought conditions, which forced the JVA to reduce the quantity of water for irrigation in the Valley from 292 MCM in 1997 to 217 MCM in 2000: about 59 percent of the cultivated land (171000 du) was used for the production of vegetables, 32.5 percent for fruit-trees, and 8.5 percent for field crops (25,000 du).

Average cultivated area during the period 1995-2000 shows that tomato, squash and eggplant crops occupied about 42 percent of the area cultivated with vegetables. Citrus trees occupied about 68 percent of the area cultivated with fruit trees, while the area cultivated with bananas occupied about 18 percent. During the same period, area planted with date palm was doubled to reach 1400 du, while that planted with grapevines remained about 2800 du. The area cultivated with banana decreased from 26.6 thousand du in 1998 to about 18 thousand du in 2000, which is equal to 30 percent of the total area.

In 2000, a drip irrigation system was used in about 82 percent of land cultivated with vegetables in the Ghors north of the Dead Sea, in nearly 100 percent in the southern Ghors and Wadi Araba, and in 52 percent of the area planted with fruit trees, especially citrus. the area of plastic houses was 9000 du and of plastic tunnels was 5800 du.

Water distribution efficiency is estimated at about 67 percent in the Ghors north of the Dead Sea and about 74 percent in the southern Ghors. Water productivity was estimated at 25 KGs/m³ of water for tomato planted under plastic houses, and 3-10 Kgs/m³ in open field production, depending on production systems, seasons, location and irrigation methods. Productivity of oranges was estimated at 1.5 Kgs/m³, mandarin at about 2Kgs/m³, grapes at 2.5 Kgs/m³ and bananas at 0.5 Kg/m³.

6-3-2 Changes that Occurred in Irrigated Agriculture in the JV

During the past two decades, irrigated agriculture in the JV was affected by several factors that had an increasing negative impact on current and future agriculture in the Valley. These factors include the deterioration in quantity

and quality of irrigation water in the Central Ghors due to water shortages, the successive years of drought, and the excessive pumping of fresh water outside the Valley, and its replacement with treated wastewater, which caused a decline in crop productivity, and stopping the cultivation of certain crops, especially those sensitive to salinity. The continuation of this situation will lead to further deterioration of the productive capacity of the soil, which is aggravated by the excessive use of fertilizers and insecticides, and will negatively affect the quality of products and their competitiveness in the export markets.

The changes in the irrigated agriculture in the JV during the last 25 years are summarized as follows:

i. Fluctuation in the Quantity and Deterioration of Water Available for Irrigation.

- Available quantity of irrigation water in the JV was 258 MCM in 1998, which included 146 MCM of surface water, 52 MCM of groundwater, and 60 MCM treated wastewater. This quantity is projected to increase to 428 MCM by the year 2020, of which 261.2 MCM will be surface water, 23.3 MCM groundwater, and 144 MCM treated wastewater.
- Water resources development in the JV depends on the development and utilization of the Yarmouk River and other surface water resources through flood control and storage in dams bordering the JV. Therefore, agriculture in the Valley indirectly depends on the amount of rainfall and the rate of water flow in the Yarmouk River and on the quantity and quality of water which feed the dams. During the past ten years, the base flow of the Yarmouk River has substantially decreased, and the quality of the Jordan River water has deteriorated due to high level of salt concentration, which made it absolutely unsuitable for agriculture.
- Following the construction of Khirbet Samra Wastewater Treatment Plant in 1985, the plant effluent has been used in agricultural production in the Central Ghors. It is projected to use this source of water for irrigation in the north Ghors. Currently 45 MCM per year of fresh water is pumped from the JV to Amman for domestic use. This quantity is expected to reach 90 MCM in the near future, which will reduce the percentage of fresh water in the irrigation water and cause further deterioration of its quality.
- Due to a steady decrease in the flow of the Yarmouk River and recurrent drought years since the 1990s, the JVA ceased to supply water for growing summer crops, for soil leaching, practiced water rationing, and rented some farm units and left them uncultivated.
- The increasing use of treated wastewater created new environmental concerns related to soil salinity, quality of JV produce, and public health hazards.
- A progressive water tariff for irrigation was introduced in 1974, while the price of water per cubic meter was 3 fils with no ceiling on the quantity of water used, it was increased in 1994 to 18 fils/m³ to be increased to 35 fils/m³ in the monthly consumption exceeds 3000 CM per farm unit.
- The efficiency of the distribution system has tangibly improved after the conversion of open canals system to pressurized system. Water distribution efficiency is estimated at about 74 percent. This development helped in reducing water losses and protecting it from pollution. Moreover, irrigation costs were also reduced, since it is no longer necessary to construct on-farms water reservoirs.

ii. Expansion of Irrigated Areas

- Irrigated areas in the JV increased from 130,000 du in 1977 to 291000 du in 2000. It is expected to increase to 427000 du by 2020, with the completion of proposed irrigation projects and the expected gradual changes to drip irrigation.

- Construction of infrastructure was extended to cover the water distribution network, irrigation canals and drainage network, especially in Central Ghors where soil salinity exhibit increasing trends.
- The increase in the irrigated areas in the Central Ghors was accompanied with decreasing quantity of available fresh water during the last years and the deterioration of water quality.

iii. Intensification of Crop Production

- The area of protected agriculture has expanded. It increased from a small area in 1975, to 9282 du under plastic houses and 5754 du under tunnels in 1999. This development did not continue due to the increasing cost of production inputs, which was not accompanied by a corresponding farm income, and because of marketing problems that faced Jordan during the early nineties.
- The intensification of the agricultural production was accompanied by the use of advanced technologies. Such technologies included the use of plastic mulch to control weeds and reduce water evaporation rate, fertigation and soil solar sterilization as a replacement of using chemicals which was positive development regarding the environment.
- The introduction of protected agriculture systems enhanced the production of high quality products as a result of better control of production environment. This production system is considered the most attractive activity for investment in agricultural production.
- The intensification of the agricultural production was accompanied with excessive use of chemical fertilizers and pesticides, which not only increased production cost but reduced production levels due to nutrient imbalance, resulting from the availability of nutrients in quantities that exceed the required amount.

iv. Development of Irrigation Systems

- A shift in water distribution systems from open canals to pressurized system was completed.
- Introduction of drip irrigation helped agricultural development in the Valley. While very limited in the 1970s and early eighties, the areas provided with drip irrigation systems, sprinklers, and surface irrigation systems constituted, in 2000, about 51 percent, 1 percent and 48 percent of total irrigated area in the Valley, respectively. Drip irrigation was initially limited to vegetables. The area planted with vegetables using drip irrigation progressively increased and covered about 92 percent of total area planted with vegetables in 2000. Recently, this system is also used to irrigate fruit trees, and the percentage of orchards irrigated by drip irrigation reached 51 percent of the total area of fruit trees.
- While the use of drip irrigation improved on-farm water-use efficiency, it can still be improved.

v. Amendment of the Jordan Valley Development Law

The Jordan Valley Development Law for the year 1988, which reserved the right of sale and purchase of agricultural units to JVA, was amended in 2001. The amended Law allows the sale and purchase of farm units for the purpose of aggregating land ownership up to a maximum of 250 du per single owner to promote investment. The Law also gave the JVA the right to set water prices according to total cost of production and distribution, to manage some of its business on a commercial basis, and to involve PS in the management of irrigation projects.

vi. Expansion of Area Cultivated with Fruit Trees

Planting fruit trees in the JV was limited to banana and citrus. Lately, other types of fruit trees have been introduced especially early grapes. Date palm was also introduced in the Middle Ghor and Wadi Araba, in replacement of vegetables because of the deterioration of quality of water and the low returns from vegetable production.

vii. Agricultural Investment in Wadi Araba

Some irrigation projects were implemented in Wadi Araba benefiting from the availability of opportunities for early production. Several projects for the production of early vegetables and fruits, and date palm, were implemented.

viii. Integrated Pest Management

Efforts were made to introduce integrated pest management system (IPM) in agriculture. However, until now this has been limited mainly to cucumber and tomato crops. The use of IPM is expected to expand due to the enforcement of strict quality standards in the export markets and increased consumers awareness.

6-3-3 Problems and Constraints

i. Agricultural Resources

- Decreasing water resources available for irrigation in the Valley due to overall increased demand for domestic, municipal, and industrial use. Priority for water allocation is given to these sectors.
- Deterioration of irrigation water quality in the Middle and Southern areas of the JV as a result of increased percentage of treated wastewater of high salinity, in the water allocated for irrigation.
- Low water use efficiency, especially at the farm level, in areas depending on traditional irrigation methods.
- Gradual soil deterioration and an increase in soil salinity as a result of using water with high levels of salinity for irrigation, irrational of fertilizers and pesticides and the lack of fresh water for soil leaching.

ii. Agricultural Production

- Decline in crop productivity, and in the net returns per cubic meter of water.
- Use of land without due consideration to the suitability of soil and water to cultivated crops.
- Implementing production patterns that are not based on market demand (local, regional and international), in terms of kinds and varieties of produce, and market demand in quantity, timing and specifications of produce.
- Lack of labs and internationally accredited institutions to grant quality certificates.

- Low institutional capacity for long-term planning regarding resource development and use in the JV and the dependence on foreign expertise, technical assistance and grants for carrying out studies and follow up and implementation of irrigation and agricultural development projects.
- Lack of special extension programs focusing on improving productivity and quality of produce in the JV.
- Weakness of government technical staff in the area of long term planning of agricultural resources development and use, and the unavailability of farmers training center in the JV.
- Irrational use of agricultural production inputs such as fertilizers, insecticides and irrigation water.

iii. Environment

- Increased soil salinity in most areas of the Valley, especially in the middle and southern Ghors of JV north of the Dead Sea, which affected the productivity of crops sensitive to salinity in these areas.
- Domestic fly outbreaks and their negative effects on tourism and other economic activities.
- Irrational use of fertilizers, herbicides, pesticides, and insecticides, which pollute the soil and groundwater.
- Low quality of agricultural products caused by increased percentage of treated wastewater in the water used for irrigation in some areas, inappropriate agricultural practices and the absence of legislation that control the use of fertilizers, pesticides, herbicides for improving the quality of produce.
- Low level of environmental awareness among farmers and Valley citizens.
- Incorrect methods for disposing of empty insecticide containers and plastic mulch, which cause soil and environment pollution.
- Limited coordination among MoA, MoWI and MMRE in the field of agricultural resource management, including measures needed to ensure sustainability of agricultural resources (soil, water, and natural vegetation).
- Deficiency of current legislations in preventing pollution of surface irrigation water and of groundwater depletion.

iv. Marketing and Enabling Environment for Agricultural Development

- Limited and inadequate agricultural research programs that do not meet farmers needs or keep pace with the development of agricultural technologies.
- Weakness of the PS organizations, especially in the field of commodity farmers associations and marketing infrastructure and companies.
- Inadequacy of know-how and educational level of farmers and workers in the sector.
- Reluctance of local population to work in agriculture and the increased dependency on expatriate labor, which constitutes 78 percent of the total agricultural labor force in the Valley.
- The absence of incentives to encourage investment in modern in irrigation technologies, crop production, and marketing.
- Weak marketing system and its failure to direct production towards demand, and to expand the production of export crops.

6-3-4 Objectives of Policies and Strategies of Agricultural Development in the Jordan Valley

1. Ensure the sustainability of irrigated agriculture in the JV.
2. Protect irrigation water resources from pollution, salinity, and provide it in good quality to allow its continuous use for unrestricted agriculture.
3. Improve the efficiency of irrigation water management in the Valley.
4. Maximize the socio-economic returns of the agricultural resources, taking into consideration the environmental dimensions.
5. Organize production to meet market demand and maximize the competitiveness of the Valley products in the export markets.
6. Encourage the establishment of farmers associations to assist in organizing and improving agricultural production.
7. Establish marketing systems that are efficient and fair to producers and improve the management of local fruit and vegetables markets and their performance.
8. Replace expatriate labor by local labor.
9. Conserve land resources and protect them from pollution.
10. Define Government role in the agricultural development of the JV.
11. Intensify cooperation with neighboring countries regarding water resources, water quality and the protection of the environment in the JV.
12. Maintain agricultural land productivity and protect it from all forms of deterioration.
13. Obtain products of high quality that meet external market standards and specifications.
14. Reduce the risks facing sustained agriculture in the Valley.

6-3-5 Strategies for Achieving the Objectives

Following is a summary of strategies to achieve the above objectives including programs, projects, and measures (programs and projects are given in matrix shown in matrix No. 3-6).

Objective 1: Ensure the Sustainability of Irrigated Agricultural Production in the Valley.

Implementation Strategies:

- Provide 386 MCM for irrigation in the JV by the year 2005, of which 323 MCM of fresh water and 63 MCM of treated wastewater suitable for unrestricted agriculture. The above quantity to be increased to 466 MCM in 2010

but will decrease to 428 MCM in 2020. This amount will be used to irrigate an area of 400,000 du in the Valley in 2010 with a cropping intensity of 110 percent through the implementation of the following projects:

1. Construction of the Mujeb, Tannour and Walah dams and the allocation of nine MCM of water from these dams for irrigation, as well as the construction of all small dams, that have been studied, to provide an additional 8.6 MCM of water for irrigation.
2. Construction of Al-Wehda dam with a storage capacity of 84 MCM and an outflow of 70 MCM in the first stage, and 108 MCM by 2010.
3. Provide about 20-30 MCM of water per annum through drilling and rehabilitation of deep wells and developing the utilization of some springs located along the King Abdullah Canal. This quantity will be used for irrigation purposes, pending the completion of the Wehdah dam and its operation at full capacity.
4. Complete the brackish water desalination projects.
5. Set up an irrigation water tariff with the main objective of increasing the efficiency of water use. Water price is to be based on the quality of water supplied, quantity and periods of supply.
6. Implement water-harvesting projects in the main watersheds to protect agricultural land from erosion (Program 1-Project 2).
7. Complete studies required to determine the quantities of water that could be made available for irrigation from deep water basins and from the Red-Dead Sea Canal Project.
8. Complete studies of the Red-Dead Sea Project and take initiatives for expediting the implementation of this project.

Objective 2: Protect Water Resources from Pollution, Salinity and Provide it in A quality to Allow its Continued Use for Unrestricted Agriculture.

Implementation Strategies:

- Increase the efficiency of the existing wastewater treatment plants, especially Al-Samra plant, and study the potential of desalinating its effluent by benefiting from the difference of altitude between the plant and the Ghor area, for the production of water suitable for unrestricted agricultural use.
- Expedite the construction of the Desi water project, and implement the Zara-Main water desalination project, for drinking purposes, which will result in reducing the salt concentration by 15-20 percent in the effluents of the wastewater treatment plants, namely Al-Samra plant and the planned Wadi Zarqa plant.
- Reduce over-pumping of groundwater, set the legal status of unlicensed wells and enforce compliance with licensing requirements.
- Change the existing treated wastewater conveyance system from the Al-Samra plant and other plants to a closed-pipe system and consider the potential of reducing the salinity of these plants effluent through desalination or using it in certain areas for the growing of specific crops in the Valley without pollution risks.

- Prevent the use of water allocated for irrigation in the JV for other purposes without providing alternative water sources suitable for agricultural use not restricted by public health or chemical or biological considerations.
- Enforce the environmental measures that prevent surface water pollution by industrial liquid wastes, car wash stations and waste landfill and develop a strategy that defines annually the quantity of fresh water from the Yarmouk River to be used for mixing with the water of King Talal Dam for keeping the salt concentration in the irrigation water at acceptable levels and ensuring its suitability for unrestricted agriculture in the Middle and Southern Ghors.
- Set up conditions for the use of treated wastewater in irrigation, based on soil types, ecological conditions, and crops.
- Implement a project to monitor water quality, starting from the source of water until its end use, to confirm its compliance with the standard specifications and monitor the effects on soil properties, productivity and quality of produce.
- Establish a database on the quality of surface water, groundwater and treated wastewater at the sources and sites of use, using the Geographic Information System (GIS) to facilitate the link with the data on basis of land resources and providing a qualified team to follow-up the evaluation and the interpretation of information and data for taking timely decisions at various levels.

Objective 3: Improve the Efficiency of Irrigation Water Management.

Implementation Strategies:

- Increase water use efficiency at farm level and expand the use of drip irrigation systems in replacement of surface irrigation (Program 1-Project 3).
- Involve PS in the management and operation of irrigation water projects in the JV similar to the management and operation of the Greater Amman drinking water (Program 1-Project 3).
- Give the Ministry of Agriculture the responsibility of supervising the management of irrigation water at farm level.
- Establish irrigation water users associations (Program 4-Project 5).
- Apply a preferential water tariff system for irrigation water that reflects the differences in quality, quantity of water consumed and supply period, and adopt the irrigation water tariff as an incentive to encourage the introduction of advanced irrigation and production technologies.
- Involve MoA in the strategic planning for irrigation water use in the JV.
- Determine crops irrigation requirements based on agro-ecological conditions including climate, soils and water, and prepare irrigation programs that maximize economic returns per cubic meter of water.

Objective 4: Maximize the Socio-economic Returns of the Agricultural Resources while Considering the Environmental Dimensions.

Implementation Strategies:

- Provide producers with information and incentives for growing high-value crops, selected on the basis of quality of irrigation water, soil suitability, ecological conditions, marketing opportunities and export capacities.
- Provide farmers with soft loans to encourage them to introduce modern irrigation and production technologies.
- Encourage PS to invest in the establishment of agricultural processing plants through promoting contractual agriculture to increase the added value of products and create job opportunities for the JV population.
- Carry out training programs for farmers on the use of agricultural inputs, water, pesticides, fertilizers, and on post-harvest technologies.
- Establish mechanisms to encourage owners of farm units to directly manage their farms and adopt measures needed for reducing the number of units that are managed by expatriate labor.
- Establish a mechanism and provide incentives to encourage the production of crops that are competitive in local and export markets.
- Develop and implement public awareness campaign and extension programs on the use of modern technologies in irrigated agriculture.

Objective 5: Organize Production to Meet Market Demand, and Maximize the Competitiveness of the Valley Products in the Export Markets.

Implementation Strategies:

- Provide long-term soft loans and other incentives to encourage the expansion of protected agriculture and intensive production systems (Program 3-Project 2).
- Divide the JV area into agricultural production zones based on criteria of climate, type of soil, water quality, productive capacity and marketing opportunities for products and promote investment in the promising areas of high productive capacity and high export opportunities.
- Conclude further bilateral agreements to open new markets (especially East European markets) and activate the Jordanian embassies to familiarize importers with the Jordanian agricultural products and their seasons of supply.
- Collect and provide essential information on the needs of local market and on the present and potential export market, to help farmers and exporters to take appropriate decisions regarding crops to be grown, timing of production and quality of products.

Objective 6: Encourage the Establishment of Farmers Associations to Assist in Organizing and Improving Agricultural Production.

Implementation Strategies:

- Provide an enabling environment, including legislation and soft loans, for establishing farmers associations in the areas of protected agriculture, marketing of citrus products in north Ghors, grapevines and date palm in middle and southern Ghors and Wadi Araba (Program 4-Projects 1,2,3 and 4).

- Provide technical and management support to the farmers association during the early stage of establishment to help these associations to assume their operations and enhance their capacity to continue performing their duties.

Objective 7: Establish Marketing Systems that are Efficient and Fair to Producers and Improve the Management of Local Fruit and Vegetables Markets and their Performance.

Implementation Strategies:

- Provide accurate and timely data and information on prices of produce in export markets and other relevant information which help in studying trends in prices, market demand in quantities, specifications, types of products and the markets absorptive capacity.
- Set up a mechanism for providing farms that have contracts for the production of export crops with the required quantities of water necessary to continue production during seasons of rationed water supply or during emergencies.
- Provide soft and long-term loans and incentives for farms specialized in the production for export

Objective 8: Replace Expatriate Labor with Local Labor.

Implementation Strategies:

- Establish a specialized training center to train farmers and laborers on the use of modern production technologies and methods of farm management (Program 2-Project 1).
- Encourage the establishment of PS companies to secure job opportunities for technically qualified agricultural labor (Program 2-Project 2).

Objective 9: Conserve Land Resources and Protect Them from Pollution.

Implementation Strategies:

- Reduce salt concentration in the effluent of As-Sam ra plant
- Provide farmers with the required quantities of water for soil leaching during the periods of low evaporation. The water should be provided at a low price because of the positive effects of this operation on the protection of land resources and the improvement of crop productivity.
- Expand drainage operations to remove salt from soils and prevent its accumulation.
- Maintain a clean environment in the JV through controlling domestic flies and the pollution of agricultural lands and King Abdullah Canal by agricultural plastic wastes, especially in the vicinity of population centers (Program 3-Project 9).
- Enact legislation to deal with environment pollutants of plastic wastes, pesticides and their empty containers and others.
- Implement measures to protect agricultural lands adjacent to wadis from seasonal flood and soil erosion.
- Define lands that could be irrigated in the areas where irrigation infrastructure has already been developed, taking into consideration continued availability of irrigation water and suitability of land for irrigation.
- Establish databases to monitor changes in chemical, biological and physical properties of soils in the JV, to evaluate the level of soil deterioration and its effect on land productivity and quality of products and propose solutions (Program 5-Project 1).

Objective 10: Define the Government Role in the Agricultural Development of the Jordan Valley.

Implementation Strategies:

- Gradually shift the responsibilities of water irrigation management from public to PS to be completed prior to 2010.
- Limit the responsibilities of JVA laboratories, located in the JV, to monitor changes in soil and water characteristics, land productivity and providing improved services to farmers.
- Take required measures to provide an appropriate enabling environment to promote investment and encourage the PS to take over complete responsibility of marketing and product processing, keeping the government role to control and organization of functions.
- Define the functions and responsibilities of the concerned government agencies with regard to resource management in JV.
- Restructure the JVA to enhance its capabilities to manage water resources and provide improved services to clients.

Objective 11: Intensify Cooperation with Neighboring Countries Regarding Water Resources, Water Quality and the Protection of the Environment in the JV.

Implementation Strategies:

- Consolidate political efforts enabling Jordan to obtain its full water rights.
- Cooperate with neighboring countries in protecting the environment and the joint water resources from pollution, provide environmental information including the potential risks of epidemics and appointing an official agency to provide the farmers with timely environmental information.
- Consolidate governmental efforts to provide additional water through joint regional water projects for maintaining the water quantities available for irrigation and providing the best opportunities to sustain irrigated agriculture in the JV.
- Initiate discussions with donor countries and international institutions to assist in implementing the Red-Dead Sea canal as a necessity for maintaining irrigated agriculture in the JV and protecting the environment.

Objective 12: Maintain Agricultural Land Productivity and Protect it from All Forms of Deterioration.

Implementation Strategies:

- Implement a detailed soil classification survey project to be used in determining soil suitability for growing different crops and as a base in evaluating changes in soil characteristics and productivity (Program 5-Project 2).
- Prepare and implement projects for soil testing to improve the efficiency of chemical fertilizer use, and to follow-up any groundwater pollution (Program 5 -Project 3).
- Divide the Valley into production areas based on marketing and productivity criteria and using this division as a base for:
 - a. Consolidating investment for export purposes;
 - b. Scheduling and programming irrigation water distribution; and
 - c. Taking strategic decisions prior to irrigating the areas, which have been developed and not cultivated.

Objective 13: Obtain Products of High Quality that Meet External Market Standards and Specifications.

Implementation Strategies:

- Strategies to ensure compliance of exported Jordanian products with the international specifications.
- Establish an accredited organization to grant certificates of quality.

- Develop a mechanism and measures for promoting production of high quality produce, including the application of IPM system and conducting measures to control pesticide residues on agricultural products.
- Update regulations regarding import, registration and using of pesticides and plant growth regulators in agriculture, and issue regulations for the disposal of empty containers and expired pesticides in order to reduce pollution of agricultural resources.
- Establish a Chamber of Agriculture.

Objective 14: Reduce the Risks Facing Sustained Agriculture in the Valley.

Implementation strategies:

- Provide incentives for exporters organizations and involve them in decision-making regarding production in the Valley.
- Commitment to implement adopted policies and apply instructions and measures in a transparent way.
- Provide effective agricultural extension services regarding the rational use of agricultural inputs including fertilizers and insecticides, time of applications and other related issues that are necessary to maximize the benefits of using these inputs and ensure their safe use.
- Develop a mechanism capable of monitoring the use of chemical materials and the measures for control.
- Prepare an annual plan by JVA, with the participation of MoA and the producers and exporters organizations, to assess the expected seasonal demand on irrigation water, and evaluate the annual amount of water that could be supplied for agriculture prior to the beginning of the agricultural season. This is to help farmers to make good and early decisions regarding crops and areas to be planted.
- Farmers should not bear any cost that may result from improving the quality of water supplied to them in replacement of fresh water reallocated for non-agricultural uses.
- Support institutions and researchers to provide and disseminate technical information on plant diseases and their control and on production inputs and their safe use.
- Provide all producers with timely information on available export opportunities and of export agendas of bilateral agreements.
- Maximize the use and benefits provided by the “Green Box” facilities including the provision of soft loan to farmers to help them in case of emergencies and loss of all or part of their production, which may happen as a result of epidemic outbreaks, frost and floods.
- Establish an Agricultural Development Fund to provide the required material and financial support to farmers in emergencies and natural disasters (Program 3-Project 8).
- New reclaimed agricultural land in the JV should not be developed unless their supply with irrigation water, in acceptable and sustainable quantities and qualities, is confirmed. This is to ensure sustainability of production and protecting the investment made in this sector.

3-6 Programs and Projects Matrix

The following matrix summarizes the suggested programs and projects, highlighting the main components of the projects, including: justification, objectives, target area/group, executing agency and partner organizations, duration and implementation requirements.

Matrix of Irrigated Agriculture in Jordan Valley

Program 1: Improvement of Management Efficiency of Water Resources in the Jordan Valley

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Increasing the efficiency of irrigation water use.

- Limited water quantity available for irrigation.
- Opportunity for increasing water and fertilizer use efficiencies through modern irrigation technologies.
- Save labor cost.
- Save water to irrigate new areas.
- Shift from surface to drip irrigation.
- Increase irrigation efficiency.
- Increase production through increasing water and fertilizer use efficiencies.

- Reduce labor cost.

- Jordan Valley

- MoA

- ACC

- JVA

- Farmers

Three Years

- Raise farmer awareness of the benefit of drip irrigation.
- Providing soft loans for introducing modern irrigation systems.

2. Water harvesting.

- Limited water resources available for irrigation.
- Large quantities of rain water that flows through side Wadis to the Dead Sea.
- Maximize the use of rainwater in the JV agriculture.
- Increase water reserves for irrigation
- Increase the quantities of water available for summer irrigation.
- Wadis overlooking the Jordan Valley.
- MoA
- MoWI

- JVA
Three Years

- Secure funding and technical assistance.
- 3. Privatization of management of irrigation projects.
 - Low efficiency of water distribution system expressed in non-systematic distribution, fluctuation of pressure in the conveyance system and unfair distribution.
 - Fluctuation of water irrigation quality in various areas and the existence of large quantities of silt in irrigation water in winter.
 - Increase the efficiency distribution system.
 - Improve the quality of irrigation water.
 - Increase water use efficiency.
 - Reduce the percentage of water loss from the distribution network.

- Jordan Valley

- JVA

- Privatization unit

- MoWI

Three Years

- Enact and enforce legislation related to this issue.
- Secure funding for implementation.

Continue program 1: Improvement of Management Efficiency of Water Resources in the Jordan Valley

Project Title Justification
Objectives Area and/or target group
Executing agency and partner organizations
Duration
Implementation requirements

- 4. Desalination of brackish water.
 - Desalinating brackish water for drinking purposes, to reduce the dependency on the Yarmouk River for drinking purposes.
 - The need for increasing water resources for irrigation in the Jordan Valley.

- Benefit from available brackish water sources.

- Middle and Southern Jordan Valley

- JVA

- MoP

- MoA

- PS

- Three Years

- Secure needed funds.

- Find a strategic partner to implement the project on a BOT basis.

5. Reduction of salt concentration of the Al-Samra effluent.

- The increase of salt percentage in King Talal Dam (KTD) waters, resulting in high percentage of salt in the As-Samra effluent arriving to the KTD

- Deterioration of the water quality of KTD, which will lead to more soil deterioration and decline of productivity and quality of agricultural products.

- Reduce the percentage of dissolved salts in the Al-Samra effluent.

- Increase the quantities and improve the quality of irrigation water.

- Control soil deterioration.

- Supply additional irrigation water for soil leaching in southern areas of the JV.

- Middle and Southern Jordan Valley.

- MoWI

- JVA

- Two to Five Years

- Monitor wastewater effluent of industries and strictly enforce the relevant legislation.

- Prepare feasibility studies of salinity reduction projects adopting advanced technologies.

- Secure needed fund.

6. Creation of a database for irrigation water.

- Lack of comprehensive information on the quality of water in the JV.

- Lack of information on types of crops to be grown with different water qualities.

- Provide information about qualities and quantities of irrigation water and distribution.

- Unify methods of data collection.

- Facilitate the tabulation and analysis of information.

- Facilitate access of the target groups to the information.

- Jordan Valley

- MoWI

- MoA

- Continuous

- Establish a section at the MoA for coordination and cooperation with the MoWI

- Recruit needed technical staff.

Program 2: Increasing the Percentage of Trained Agricultural Labor

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Development of skills of agricultural workforce.

- Shortage of Jordanian labor trained in modern agricultural technologies and farm management.
- Increasing unemployment among the Jordanian young men.
- Provide skilled local labor in new agricultural technologies.
- Contribute to the solution of the problem of unemployment of Jordanian labor in the JV.
- Ensure sustainable development through developing national expertise in modern technologies.
- Jordan Valley
- MoA
- VTC/MOE
- PS
- MoL
- Local Fund Foundations
- Universities

Continuous

- Establishment of an agricultural training center in the JV.
 - Providing vocational training in agriculture in the JV schools for training skilled labor.
- #### 2. Establishing companies to secure jobs for technically qualified agricultural labor.
- Unorganized temporary labor in the JV.
 - Shortage of job opportunities for the graduates of vocational schools.
 - Absence of health insurance and social security for the temporary labor.
 - Secure job opportunities for vocational training graduates.
 - Ensure availability of local temporary and permanent labor.
 - Provide technical supervision of agricultural laborers.
 - Provide health insurance and social security for the agricultural laborers.
 - Jordan Valley.
 - MoL
 - PS

- MoA
- DEF
- NAF
- MoP
- RPO
- SS
- Continuous
 - Establishing a monitoring system for established companies.

Program 3: Increasing Agricultural Production Efficiency

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1.Improving the efficiency of agricultural production.

- Jordan Valley competitive advantage is not being properly explored.
- Continued traditional agriculture resulting in low returns and market congestion.
- Maximize the competitiveness of the JV products.
- Introduce new alternative cropping systems.
- Test new types of crops and train farmers in growing selected crops.
- Farmers
- MoA

- MoP

- SPEVF

- PS

- Universities

Five Years

- Develop and increase funds allocated for agricultural research and extension centers in the MoA.

2. Promotion of protected agriculture (in plastic houses).

- Low productivity of open-field agriculture.

- High water requirements in open-field agriculture.

- High productivity of protected agriculture and high quality of produce.

- Increase crop productivity.

- Reduce crop water consumption.

- Improve quality of produce by using high yielding varieties and modern methods of production and plant protection.

- Providing better control of production time by reducing the effects of climatic factor.

- Farmers

Three to Five Years

- Secure soft loans from ACC.

- Advise farmers and encourage them to use protected agriculture.

- Provide incentives for protected agriculture such as providing water for solar sterilization in summer.

3- Enhance environmentally safe plant protection methods.

- Low quality of Jordanian agricultural products in general.

- Poor export opportunities because of low quality of Jordanian products.

- Negative environmental impact of agricultural chemicals.

- Help farmers to use environmentally safe plant protection systems.

- Restore and protect natural balance between pests and their natural enemies.

- Attain sustainable and healthy agricultural production.

- Specify markets for the high priced integrated pest management products.

- Farmers

- MoA

- MoP

- PS

- Farmers

Three to Five Years

- Advise farmers and encourage them to use the IPM system in vegetable productions.

4.Improvement of the agricultural extension system in the JV.

- Low technical and management level of farmers, which leads to low production efficiency.
- Optimal use of resources and production inputs is not applied.
- Develop an effective agricultural extension system capable of improving extension programs in the areas of allocation of agricultural resources, farm management and sustainable development.
- Jordan Valley

- M oA

- M oP

- PS

- U niversity

Five Years

- Provide required funds.
- Provide expertise and trained extension agents.

Continue program 3: Increasing Agricultural Production Efficiency

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

5. Control of pesticide residues.

- Limited quantities of high quality products in the external markets.
- Poor export opportunities for Jordanian products.
- Improve the quality of agricultural products regarding pesticide residues to meet international standards.

- Farmers.

- M oA

- SPEV F

- Fam ers

Continuous

- Secure needed fund.

- Provide qualified staff to control operations.

6. Compliance of Jordanian products with international and European specification.

- Jordan accession to WTO.
- Strictness of European markets regarding compliance with international quality specifications.
- Increased competition for Jordanian products in export markets.
- Establish an agency accredited to issue quality certificates.
- Familiarize the farmers with the international specifications.
- Monitor product quality at farm level.
- Farmers.
- Exporters.
- ISM
- M oA
- M T I
- M O P
- SPEVF
- Quality Unions

Three Years

- Develop the toxicity analysis labs.
- Enfore and develop legislation and regulations.

7 Establishing centers for the development of marketing services.

- Farmers and agricultural organizations need marketing information.
- Facilitating the familiarization of farmers and exporters with export markets and opportunities available in these markets.
- Upgrade marketing services through conducting research and field experiments, providing marketing information and developing well trained and qualified staff in the public and private sectors.
- Farm ers in Jordan V alley
- Exporters
- M oA
- M oP

- SPEVF
- Farmers
- Quality Union

Three Years

- Provide technical and administrative staff for the centers.
- Secure required fund.

8. Establishing an agricultural development fund (ADF).

- Lack of aid resources or special funds for use in case of emergencies and force majeure cases.
 - High risk in the agricultural production in general.
 - Provide loans and assistance to farmers in case of emergencies and natural disasters.
 - Cover some risk factors in the agricultural production.
 - Farmers
 - MoA
 - MMRE
 - Farmers
- Three years
- Enact needed legislation for the ADF
 - Provide qualified staff for managing the ADF
 - Amend the wholesale markets by-laws to allocate part of collected market fees for this fund.

Continue program 3: Increasing Agricultural Production Efficiency

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

9. Maintaining a clean environment in the JV.

- Spread of domestic flies through out the JV areas due the mis-application of organic manure.

- Plastic wastes, especially black mulch are scattered in the JV and are not disposed off by farmers at the end of season.

- King Abdullah Canal is polluted specially near population centers.
- Halt the spread of domestic flies in the JV.

- Prevent land pollution by plastic wastes.

- Protect the water in the King Abdullah Canal from pollution.
- Jordan Valley
- JVA

- MOA

- GCPE

Continuous.

- Enact needed legislation.

- Define role and responsibility of government and PS agencies with respect to the protection of the environment in the JV.

- Provide required funds.

Program 4: Establishment of Commodity Farmers Association in the Jordan Valley

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Establishment of a farmers association for protected agriculture.

- Production is not jointly planned by farmers.
- The product quality is poor due to shortage of information and training of farmers on post- harvest operations.
- Production is not market oriented
- Low technical and farm management level of farmers.
- Organize production.
- Increase production efficiency and maximize returns.
- Train and increase farmers' awareness of new production technologies.
- Establish centers for sorting, grading, packaging and pre-cooling of produce.
- Market the products of the association members.
- Participate in decision and policy- making, in connection with protected agriculture and produce marketing.
- North Jordan Valley.
- Farmers of protected

agriculture in the JV.

- MoA

- ACC

- JVA

Three Years

- Enact needed legislation.

- Allocate a plot of land for building a center for sorting, grading packaging, pre-cooling and for the administration of the association.

2. Establishment of a farmers association for the production and marketing of citrus fruit in North JV.

- Maximization of the competitive advantage of the Valley in the production of Citrus fruits.
- Low quality of Jordanian produce due to traditional production practices and limited use of advanced post harvest technology.
- Organize production.

- Increase production efficiency and maximize returns.
- Train and increase farmer awareness of new production technologies.
- Establish centers for sorting, grading, packaging and pre-cooling.
- Market the products of the association members.
- Participate in decision and policy- making, in connection with protected agriculture and produce marketing.
- North Jordan Valley
- Farmers of citrus fruits in

JV.

- MoA
- ACC
- JVA

Three Years

- Enact needed legislation.
- Allocate a plot of land for building a center for sorting, grading packaging, pre-cooling and for the administration of the association.

Continue program 4: Establishment of Commodity Farmers Association in the Jordan Valley

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

3. Establishment of a farmer association for the production and marketing of grapes in the Middle and Southern, Ghor Elsafi And Wadi Araba.

- Enhance the production of early grapes, which have great export opportunities because of early production.
- Inefficient utilization of south Ghors water in summer especially surface water resources, not stored in dams.
- Organize production.
- Increase production efficiency and maximize returns.
- Train and increase farmer awareness of new production technologies.
- Establish centers for sorting, grading, packaging and pre-cooling of produce.
- Market the products of the association members.
- Participate in decision and policy making, related to grapes production and produce marketing.

- Participate in policy and decision- making in connection with planting grapevines in areas where water is available in summer and especially Ghor Elsafi.
- Middle and Southern Jordan Valley
- MoA

- Farmers
- Three to Five Years
- Enact needed legislation.

- Allocate a plot of land for building a center for sorting, grading packaging, refrigeration and the administration of the association.

Continue program 4: Establishment of Commodity Farmers Association in the Jordan Valley

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

4. Establishment of a farmer association for date palm growers in JV.

- Insufficient exploitation of saline soils that are not suitable for traditional agriculture.
- Problems facing farmers in use of water resources that are not suitable for traditional agriculture.
- Limited attention given to the growing of high value varieties in demand, such as Barhi, Majjociland diglatnoor.
- Organize production.
- Increase production efficiency and maximize returns.
- Train and increase farmer awareness of the production technologies.
- Establish centers for sorting, grading, packaging and pre-cooling.
- Market the produce of the association members.

- Participate in decision and policy making, related to date palm growing and produce marketing.
- Participate in policy and decision- making that are relevant to planting and marketing of dates.
- Utilize the marginal lands for growing dates.
- Utilize brackish and treated water resources in growing date palms.
- Date palm farmers in Jordan Valley
- Concerned farmers in the Middle and South Jordan Valley, Ghor Elsafi and Wadi Araba.

Three to Five Years

- Enact needed legislation.
- Allocate a plot of land for building a center for sorting, grading packaging, refrigeration of produce and for the administration of the association.

5. Establishment of irrigation water users societies in the JV.

- Disputed fairness in the allocation and distribution of irrigation water (including quality and quantity)
 - High losses in water distribution system.
 - Participate in setting water distribution programs for farmers in the working area of the society in cooperation with the Jordan Valley Authority.
 - Participate in increasing member awareness of new irrigation methods, optimal water use and maximization of returns per cubic meter of water.
- Jordan Valley

- Jordan Valley Farmers

Three Years

- Enact needed legislation.

Program 5: Protection of Land Productivity.

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- Establishment of a land database for the JV.

- Multiple and sometimes conflicting sources of information on land resources.
- Shortage of information on the efficiency of land use.
- Lack of reliable information needed for planning purposes.
- Provide information on resource use efficiency

- Evaluate land productivity and the level of degradation of resources.
- Provide information for planning purposes.

- Jordan Valley.
- MoA

- JVA
Continuous
- Provide skilled staff, and equipment.

- Secure funds.

2. Soil survey and classification and evaluation of land productivity.

- Lack of detailed information on the characteristics of agricultural land including soil texture, soil types, problems and level of fertility.

- Shortage of information on soil suitability for various crops.
- Lack of baseline information needed to assess land productivity.
- Accelerated rate of deterioration of lands irrigated with water of high salinity.
 - Understand land problems in the JV.
 - Provide information necessary for land productivity evaluation.
 - Provide basic information for agricultural development projects.

- Jordan Valley
- MoA

- JVA
Continuous
- Establish a specialized section at NCARTT.

- Develop; labs

- Secure funds.

3. Monitoring soil pollution.

- Increased utilization of irrigation water of high salinity.
 - Protect land resources from pollution.
 - Improve the efficiency of resource utilization.

- Jordan Valley
- MoA

- JVA
Continuous
- Develop laboratories, equipment and staff.

- Provide funds.

[1] Ministry of Water and Irrigation, Report on available and expected quantity of irrigation water by 2002

The National Strategy for Agricultural Development

2002-2010

6-4 Irrigated Agriculture in the Highlands

6-4-1 Current Status

Irrigated agriculture in the Highlands comprises two distinct agricultural systems. The first is based on the use of irrigation water that flows in wadis (estimated to be around 60 MCM) and of water springs (of about 20-30 MCM). This system is dominated by small land ownerships and to some extent by traditional agriculture. The second system is based on the use of groundwater for irrigation, with an estimated volume of extraction, in 2000, of about 198.5 MCM. This system is dominated by large holdings and has the potential to introduce modern technologies in production and marketing of produce.

According to the General Department of Statistics, the irrigated area in the Highlands was about 420,000 du in the year 2000 (about 55 percent of the total area of irrigated land in Jordan, of about 769,000 du). The area of irrigated land in the Highlands is distributed over the various governorates of the country, but is mainly located in the Mafrqa, Zarqa, and Amman governorates. The irrigated area planted with fruit trees in the Highlands was about 238,000 du in 2000 occupying 57 percent of the area, of which more than two thirds was planted with olive, followed by apple, grapevine, and stone- fruits. The area planted with vegetables was 139,000 du occupying 33 percent of the area, of which tomato was the major crop, followed by watermelon, melon, cauliflower, and cucumber, being the major crop grown in plastic houses, with an area of about 5,000 du. The area planted with field and fodder crops was 43,000 du or 10 percent of the Highlands irrigated area.

In the year 2000, irrigated agriculture in the Highlands consumed about 298 MCM (an average of 700 CM per du), of which 198.5 MCM of ground water, 88.5 MCM of surface water (streams and springs), and 11 MCM of treated wastewater. To ensure the sustainability of groundwater resources, the Government is planning to reduce the quantities of extracted groundwater, for agricultural purposes, to about 186 MCM by 2005, 148 million by 2010, and 86 million by 2020. The quantity of wastewater used in irrigation will increase to 30 MCM by 2005, 41 million by 2010, and 61 million by 2020. The quantities of water available for irrigation from the various sources will therefore remain constant until 2005, but will decrease by about 8 percent in 2010, and by about 22 percent in 2020. The water quality is expected also to change due to the increasing use of treated wastewater.

6-4-2 Changes that Occurred in Irrigated Agriculture in the Highlands

- The area of irrigated agriculture in the Highlands has witnessed large increases over the last two decades, due to:
 - Unstrict enforcement of groundwater extraction regulations.

- Most farmers exceeded the allowed water pumping quantities.
 - Many farmers dug wells without licensing.
 - Government failure to enforce regulations and to take the required measures to end above violations.
- The irrigated area increased from about 130,000 du in 1980, to about 310,000 du in 1996, and to 420,000 du in 2000.
- Over-pumping of groundwater in the Highlands for agriculture, domestic and industrial purposes amounted to about 425 MCM in 2000, this is about twice the level of safe yield of extraction estimated at (275-300 MCM), which resulted in the draw-down of water levels in groundwater basins and increased salinity, as is the case in the Dhuleil, Azraq, and some of Amman/Zarqa area basins. Such continued level of over-pumping threatens most groundwater basins in the Kingdom.
- Over-pumping of groundwater basins resulted also in a great reduction in water discharge of springs, which is generally used for irrigating small farms all over the Kingdom, with direct negative effects on rural development, the ecosystems, and agro-biodiversity in areas irrigated by the springs.
- The concentration of Jordan's population in the Highlands resulted in the production of large quantities of treated wastewater in these areas, and in contaminating some groundwater basins and surface water resources. While using treated wastewater for agricultural purposes in the Highlands does not exceed 11 MCM per annum at the present time, it is planned to increase to 61 MCM by 2020.
- The fruit tree sector witnessed a large increase in the planted area, especially olive, apple trees, and stone-fruits. Production of irrigated Highlands of these crops contributed to the reduction of imported fruits and created stability in the annual production of olive and olive oil, especially during dry years where irrigated production substitutes for the shortage in the rain-fed production.
- Advanced technologies and production methods have been introduced, which helped in improving productivity of all crops, quality of produce, and opening new export opportunities to some products with a competitive advantage of early season production.

6-4-3 Problems and Constraints

i. Resources

- Limited water resources available for irrigation and its decreasing availability in light of increasing water needs for other purposes, and giving priority in water allocation for municipal and industrial uses.
- Deterioration of the quality of irrigation water in areas dependent on groundwater due to over-pumping.
- Inefficient use of irrigation water at farm level, due to farmer lack of knowledge regarding water crop requirement, and of modern on-farm irrigation systems.
- Excessive use of fertilizers and pesticides due to farmers' lack of knowledge of plant requirements, resulting in excessive use, increased production cost, and negative impact on quality of produce and pollution of soil.
- Gradual deterioration of soil characteristics and increased soil salinity in general, due to increased salt concentration in irrigation water resulting from over pumping of groundwater, pollution of surface water by treated wastewater and the use of treated wastewater for irrigating lands along wadis and streams.

ii. Production

- Low productivity and low net returns per unit area and per cubic meter of irrigation water.
- Use of land regardless of suitability for crops.
- Crop production is not market-oriented, regarding varieties, quantities, time of production, and quality of produce in demand, resulting in marketing congestions for some products and consequent decline in producer's prices.
- Insufficient post harvest infrastructure such as pre-cooling, grading, packaging, transport, etc.
- Unavailability of dependable and accurate agricultural database needed for proper planning of production according to market needs, in quantities, varieties, and timing of production.
- Weakness of agricultural extension services and of training programs for raising farmer awareness regarding environment-friendly production systems, such as integrated pest management.
- Excessive use of production inputs (fertilizers, pesticides, and irrigation water).
- Poor quality of agricultural products due to unsuitable agricultural production methods.

iii. Environment Protection

- Inadequate or absence of legislation to reduce the increasing rate of pollution of surface water resources used for irrigation and the depletion of groundwater basins.
- Irrational use of fertilizers and pesticides, causing the pollution of soil and groundwater basins, and the absence of legislations to fully address these problems.
- Limited public awareness campaigns dealing with improper practices that have negative impacts on the environment, such as disposal of waste of olive presses, plastic used in agriculture and others.

iv. Marketing and Enabling Environment

- Limited agricultural research and extension activities targeted to address major problems facing producers, and respond to changing farmer needs and technological advancement.
- Absence of organizational structures, specifically farmer organizations and marketing companies of suitable size.
- Lack of government incentives to encourage investment in modern irrigation and production techniques.
- Lack of planned and sustained promotion campaigns for Jordanian produce, and limited export market studies.
- Weakness of the marketing system and its inability to guide production to meet market demand and expand production for export.
- Absence of contractual farming resulting in poor opportunities for marketing of products of good export potential.
- Absence of internationally accredited laboratories to issue certificates of quality.

- Inadequate or poor enforcement of relevant legislations.

6-4-4 Objectives of Policies and Strategies of Irrigated Agriculture Development in the Highlands

1. Ensure the sustainability of irrigated agriculture in the Highlands within the limit of available water resources.
2. Protect irrigation water resources from pollution and salinization and provide it in a quality that allows continuation of its use in unrestricted agriculture.
3. Maximize the economic and social returns of water resources used in irrigation.
4. Organize production to meet market demand, and maximize the competitiveness of Highland products in the export markets.
5. Encourage the establishment of farmer associations to assist in organizing, developing and marketing of production
6. Provide fair and efficient marketing systems and channels for producers.
7. Enhance the productivity of land resources and protect them from deterioration and pollution.
8. Improve the quality of agricultural produce.
9. Introduce and apply environment friendly production systems when using treated wastewater in agriculture.
10. Develop agricultural production systems that enhance the efficiency of surface water use.
11. Reduce the risks facing sustained irrigated agriculture in the Highlands.

6-4-5 Strategies for Achieving Objectives

Following is a summary of strategies to achieve the above objectives including programs, projects, and measures (programs and projects are given in matrix shown in matrix No. 4-6).

Objective 1: Ensure the Sustainability of Irrigated Agriculture in the Highlands Areas within the Limit of Available Water Resources.

Implementation Strategies:

- Gradually reduce the quantities of extracted groundwater for agriculture use from 198.5 MCM in 2000, to 86 MCM in 2020.

- Limiting water extraction from deep wells for irrigation is to be preceded by a survey of lands under irrigation to be carried out jointly by the MoA and the MoWI.
- Set a suitable water tariff system for extracted groundwater for agricultural use, to limit over-pumping, taking into account licensing conditions, quantity of water pumped, and the efficiency of its use. This should also be preceded by a study to assess the socio-economic impact of such a tariff on farmers. The tariff should be gradually applied to enable producers to adjust to the new conditions.
- Purchase and close of some agricultural wells by government to reduce extraction from certain water basins.
- Continued ban on licensing of new wells for agricultural uses.
- Provide alternative water resources for municipal and industrial uses.
- Reduce losses and misuse of water supplied through rehabilitation of municipal water distribution networks.
- Ban the extraction of water from unlicensed wells.
- Gradually reduce water pumping from the southern areas of Jordan, and focus on its use for the production of fruits and competitive export crops in local and international markets, that are highly efficient in using irrigation water.
- Provide 234 MCM of irrigation water by 2020, of which 87 MCM of surface water, 86 MCM of groundwater, and 61 MCM treated wastewater of a quality suitable for unrestricted agriculture against a total of 287 MCM used in 2000.
- Implement water-harvesting projects in the Highlands to reduce the rate of pumping of groundwater and of water salinity through the mixing of water from these sources (Program 6-Project 2).
- Improve the efficiency of irrigation water management at farm level.

Objective 2: Protect Irrigation Water Resources from Pollution and Salinization, and Provide it in a Quality that Allows the Continuation of its Use in Unrestricted Agriculture.

Implementation strategies:

- Improve the efficiency of wastewater treatment plants.
- Reduce over-pumping of groundwater, close down unlicensed well, and comply with the conditions of licensing.
- Enforce the environmental protection measures to prevent mixing of industrial liquid wastes, solid waste of landfills, and car-wash waste with surface water, and protect groundwater from pollution.
- Set specific regulations for the use of treated wastewater in irrigation, taking into consideration the varying agro-ecological conditions, including soil characteristics, climate, and purposes of water use.
- Familiarize farmers with special conditions and practices of treated wastewater use in irrigation.
- Develop a mechanism for monitoring the quality of groundwater and treated wastewater to ensure compliance with the adopted specifications, and to measure the effects of using this water on soil properties, crop productivity, and the quality of produce through expanding the activities of the Water Monitoring (Project currently being implemented by the Ministry of Water and Irrigation.)

- Establish a database on the characteristics of surface water, groundwater, and treated wastewater resources, defining their locations and use and linking this information with the database on land resources through developing the Water Information System currently available at the MoWI to assist in making timely informed decisions at all levels.

Objective 3: Maximize the Economic and Social Returns of Water Resources.

Implementation Strategies:

- Encourage contractual agricultural production for produce processing, to increase the added value of agricultural products, and for export.
- Finance programs to train farmers on the rational use of agricultural inputs including, water, pesticides and fertilizers, and on post-harvest technologies to improve product quality (Program 4-Project 1).
- Develop a mechanism for providing incentives to farmers to apply modern agricultural practices and technologies that would improve the quality of produce.
- Prepare a strategy for the use of brackish water in irrigation that aims at protecting the environment and maximizing returns from using such water.
- Provide incentives to promote the use of soilless agricultural technologies.

Objective 4: Organize Production to Meet Market Demand, and Maximize the Competitiveness of Highland Products in the Export Markets.

Implementation Strategies:

- Provide long-term soft loans as well as other incentives to promote protected agriculture and intensive cropping systems.
- Define areas most suitable for the production of specific export crops, based on climate conditions, soil type, water quality, and export opportunities, and promote investment in areas of high potential for the production of export crops (Program 1-Project 1).
- Introduce new, high-value crops with competitive capacity in export markets (Program 5-Projects 3,4, Program 6-projects 4,5).
- Provide essential information about local and external market needs to assist farmers in taking appropriate decisions regarding production.
- Benefit from the comparative advantages of the early season production of some crop varieties (Program 5-Projects 3,4).
- Improve production technologies and increase resource use efficiency (Program 3-Projects 3,4,5, Program 4-Project 1).
- Develop training programs on the proper use of agricultural inputs and the control of quality and quantity used (Program 3-Project 3).

- Enact by-laws and regulations for labeling of varieties and rootstocks of imported and locally produced fruit tree seedlings, issue certificates of origin (for fruit tree seedlings), and control the sale of seedlings in private sector nurseries and sale stands (Program 4-Project4).

Objective 5: Encourage the Establishment of Farmers' Association to Assist in Organizing, Developing and Marketing Production.

Implementation Strategies:

- Provide an enabling environment to promote investment in the marketing sector, including legislation and provision of soft loans needed for establishing commodity farmers association, for the production of high potential of export crops (Program 1-Project2).
- Provide early-stage technical and administrative support for commodity farmer associations to assist them in starting their activities, and enhance their capacity to continue performing their duties.

Objective 6: Provide Fair and Efficient Marketing Systems and Channels for Producers.

Implementation Strategies:

- Provide accurate and timely data and information on the prices of products in local and export markets as well as other information that help in studying trends of prices and market needs in quantity, quality, varieties, timing, and markets absorptive capacity.
- Provide long-term soft loans to farmers specializing in production for export (Program 5-Project2).

Objective 7: Enhance the Productivity of Land Resources and Protect them from Deterioration and Pollution.

Implementation strategies:

- Continue the development of the wastewater treatment plants to help reduce salt concentration in their effluents.
- Implement water-harvesting programs to assist in reducing the rate of groundwater extraction (Program 6-Project2).
- Develop a suitable mechanism for the collection and recycling of plastic wastes and the disposal of empty pesticide containers and expired pesticides, to avoid soil pollution.
- Establish databases to monitor changes in chemical, biological, and physical soil characteristics over regular time periods, to assess the rate of accumulation of salts and harmful elements, the level of soil deterioration, and evaluate the effects on land productivity and on quality of produce (Program 2-Project3).

- Carry out a detailed survey for main agro-ecological zones to define the most suitable crops for growing in each of these zones. Such a survey would also be used as benchmark for evaluating the changes in soil characteristics and in land productivity (Program 1-Project 1).
- Implement a program for soil and water analyses to assist in protecting soil fertility and improving the efficiency of input use (Program 4-Project 2).
- Define areas most suitable for the production of specific agricultural crops, based on production and marketing potentials, and using such data to encourage investments in production for export.

Objective 8: Improve the Quality of Agricultural Produce.

Implementation Strategies:

- Encourage the use of post-harvest technologies (Program 3-Projects 4,5).
- Assign an efficient entity to issue quality certificates and prepare and adopt specifications for Jordanian products in line with international standards.
- Establish a mechanism and undertake suitable measures to promote the use of advanced production technologies, biological pest control and organic farming methods, and to control pesticide residues on agricultural products (Program 3-Projects 1,3).
- Improve plant protection practices by promoting integrated pest management systems (Program 3-Project 3).
- Review measures followed in registering and importing of production inputs and their use, and develop and enforce safe methods for the disposal of empty pesticide containers.
- Introduce advanced production technologies and provide specialized agricultural extension services in the area of improving quality of produce.

Objective 9: Introduce and Apply Environment-Friendly Production Systems when Using Treated Wastewater in Agriculture.

Implementation Strategies:

- Assign a public institution responsible for defining crops that could be produced using this water, taking into consideration type of soil and quality of treated wastewater.
- Establish a committee responsible for preparing strategies and plans for the use of treated wastewater in agriculture.
- Finance water-harvesting programs (small dams) in the Highlands to provide additional water resources for improving the quality of treated wastewater through its mixing with fresh water, and to reduce its negative effects on soil salinity (Program 6-Project 2).
- Promote the use of treated wastewater in the production of silage, industrial crops, flowers, and timber (Program 6-Projects 1,3,4).

Objective 10: Develop Agricultural Production Systems that Enhance the Efficiency of Surface Water Resources.

Implementation Strategies:

- Develop and rehabilitate irrigation canals to increase the efficiency of surface water use and avoid its pollution with treated wastewater (Program 2-Project 2).
- Develop the basic infrastructure in the irrigated areas, including roads and other supporting infrastructure (Program 2-Project 1).
- Develop marketing systems and promote post-harvest technologies.
- Provide soft loans to small farmers to assist them in adopting advanced production technologies.
- Take all needed measures to avoid pollution of surface water by wastewater.

Objective 11: Reduce Risks Facing Sustained Irrigated Agriculture in the Highlands.

Implementation Strategies:

- Increase the efficiency of wastewater treatment plants.
- Provide farmers with treated wastewater at reasonable prices linking it to the type of crop grown and the efficiency of wastewater use.
- Conduct a study to evaluate the socioeconomic impact of applying new irrigation water tariff for surface, ground, and treated wastewater.
- Reduce over-pumping of groundwater, close down unlicensed wells, and abide to licensing conditions.
- Establish ground water users associations to collaborate with MoA and MoWI to control water extraction and organize agricultural production.
- Implement a project to monitor the quality of ground and treated wastewater to ensure compliance with the established specifications and to monitor changes in soil characteristics, productivity, and quality of products.
- Enforce environmental measures that prevent the mixing of industrial liquid waste, car-wash waste, and solid waste with fresh water.
- Develop a program for providing and disseminating technical information on the risks of uncontrolled use of production inputs, especially wastewater, and on the safe methods of using these inputs.
- Support exporter organizations and involve them in taking decisions concerning the organization of production.
- Ensure the stability of agricultural policies and the commitment of institutions responsible for implementing policies and related regulations and measures in a transparent manner.
- Monitor the use of production inputs.

- Establish a system for providing producers with market information on export opportunities in external markets and time schedules for export to neighboring countries in accordance with bilateral agreements.
- Develop and implement a specialized agricultural extension program in the area of safe and rational use of agricultural inputs, including fertilizers, pesticides, and other related matters to maximize economic returns of using such inputs and ensure their safe use.
- Implement water harvesting projects to reduce the rate of groundwater extraction and reduce production costs (Program 2-Project 4, Program 6 - Project 2).
- Use the facilities and policies provided by the Green Box to assist farmers in emergency situations, such as in case of losing part of their crops as a result of epidemic outbreaks, frost, and others natural disasters (Program 1-Project 4).

4-6- Programs and Projects Matrix:

The following matrix summarizes the suggested programs and projects, highlighting the main components of the projects, including: justification, objectives, target area/group, executing agency and partner organizations, duration and implementation requirements.

Program 1: Organize Production

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- Soil survey for productivity evaluation.

- Lack of comprehensive information on agricultural lands, and on soil properties and problems.
- Shortage of information on soil suitability for various crops.
- Lack of baseline data for land productivity evaluation.
- Accelerated rate of soil deterioration in land irrigated with water of high salinity.
- Identify land problems.
- Provide information necessary to evaluate productive potentials of land.
- Determine soil suitability for various crops.
- Provide information for developmental projects.

Main production areas

- MoA

- MoP

Continuous

- Establish a specialized section at NCARTT to conduct the required surveys.
- Develop required labs.
- Provide funds.

2- Establishment of commodity farmers associations.

- Absence of organized production for various crops.
- Poor post-harvest operations.
- Low technical and farm management level of farmers.
- Organize farmer activities
- Involve farmers in planning for agricultural production.
- Assist farmers in taking decisions on production.

Vegetables and fruit tree farmers

- MoA

- PS

Three to Five Years

- Enact legislation and regulations needed for establishing these associations.

3- Processing of agricultural products.

- Low returns for farmers and processing plants from the existing government intervention in tomato processing.
- Absence of contractual production for crop processing,
- Lack of feasibility studies for agricultural processing and the fear of establishing industries that are not economically justified. .
- Develop the agricultural industries on the basis of production contracts with farmers.
- Eliminate government intervention in establishing or participating in agricultural processing enterprises.
- Increase the added value of agricultural products.

- Private-sector

- Farmers

- PS

Three Years

- Privatization of the agricultural Marketing and Processing Company (AMPCO).

4- Establishment of an agricultural development fund.

- Lack of available sources of aid to assist farmers during emergency and natural disasters.
- The high (financial) risks associated with agriculture.
- Lack of mechanism that ensures the protection of investment in the Highlands irrigated agriculture.
- Help farmers during emergencies and natural disasters.
- Protect agricultural investments.

All farmers.

- MoA

Three Years

5- Establishment of a groundwater users society in the Highlands.

- Farmers do not participate in decisions related to groundwater extraction and use.
- Agricultural production is not organized on the basis of available water, nor on market requirement.
- Unsustainable use of water groundwater resources.
- Involve farmers in decisions related to groundwater extraction and use.
- Optimize use of groundwater without depleting it.
- Organize production according to available water quantities and market demand.
- Protect water resources and prevent their deterioration.
- Achieve transparency in groundwater allocation and use.

Farmers using groundwater in the highlands

- MoWI
 - Users of groundwater
- Three Years
- Legislation
 - Provide funds.

Program 2: Protection and Improvement of Resource Utilization

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- Improvement of farm to market roads.

- Absence of adequate agricultural roads in several production areas.
- The negative effect of dust on the quality of products and on the agricultural environment.
- Agricultural investors turn away from investing in some areas due to the lack of good road network.
- Facilitate farmer access to production areas.
- Facilitate marketing of produce.
- Protect the quality of production by facilitating swift delivery to the wholesale markets.

Areas along main streams.

- MoA
- MoWI
- MoPW

Five Years

- Plans for target areas.
- Provide funds.

2- Rehabilitation of irrigation canals to reduce water losses.

- Increased percentage of water losses from earth canals in areas depending on springs and streams.

- Low water-use efficiency.
 - Improve water-use efficiency.
 - Protect water resources from pollution.
 - Rehabilitation of springs and increasing land productivity.
- Areas irrigated by spring and stream.
- MoA
 - MoWI
 - MoPW
- Three Years

- Study target areas and prepare plans for the promising areas.
 - Provide funds.
- 3- Establish an agricultural resources database.
- The existence of multiple sources of information on agricultural resources.
 - Shortage of information on resource use efficiency and evaluation.
 - Lack of reliable information needed by agencies concerned with planning.
 - Provide information on resource use efficiency.
 - Evaluate productivity of resources.
 - Evaluate the extent of deterioration of agricultural resources.
 - Provide reliable information for planning purposes.
- All irrigated areas.
- MoA
 - MoWI
 - NCARTT
- Three Years

- Provide skilled staff and equipment for carrying out the work.
 - Provide required funds.
- 4- Water harvesting.
- Limited water resources in the Highlands.
 - Inadequate exploitation of rainfall and floodwater in some areas.
 - Optimize the use of water resources
 - Provide additional water quantities and developing new areas of agriculture.
- Areas suitable for water harvesting.

- MoA
- MoWI
- JVA
- MoP
- Universities
- Three to Five Years
- Prepare feasibility studies for water-harvesting possibilities in the various areas.
- Provide funds.

Program 3: Upgrading the Quality of Produce

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- Development of olive production.

- Low productivity and inefficient returns of irrigated olives in the Highlands.
- Increase productivity of olive trees and reduce costs of production.
- Maximize irrigation efficiency and economic returns per cubic meter of water.

Olive groves

- MoA
- NCARTT
- Three to Five Years
- Development of special agricultural extension programs.
- Provide funds.

2- Development of olive oil marketing in local and export markets.

- Low quality of olive oil due to traditional method of picking and handling of fruits.
- Weak competitiveness in external markets.
- Increase income of olive growers.
- Stabilize olive oil prices.
- Improve competitiveness of Jordanian olive oil.
- Farmers
- Olive presses
- OQU
- MoA
- MIT
- JISM
- AOPO
- MoP

- OQU

- Universities

Three Years

- Establish an association for olive producers.
- Develop well-trained agricultural extension officers.
- Provide funds.

3- Integrated pest management for fruit trees.

- Poor control of pesticide use in fruit trees orchards.
- Increased cost of production due to irrational use of production inputs.
- Low quality of produce.
- Improve marketing quality of produce.
- Reduce production costs.
- Protect the environment and public health.

Fruit tree orchards

- MoA

- NCARTT

- Universities

Three to Five Years

- Develop and enforce relevant legislation.
- Train and develop needed agricultural extension staff
- Provide funds.

4- Safe use of pesticides.

- Poor control of pesticide use in vegetables.
- Low quality of products.
- Poor monitoring of chemical use
- Obtain reputable and safe Jordanian products regarding pesticide residues, and protect the public health and environment.

Areas cultivated with vegetable.

- MoA

- PS

Three Years

- Develop and enforce of legislation.
- Develop of specialized agricultural extension officers.
- Provide funds.

5- Assignment of an official entity to issue quality certificates.

- The need for such agency following Jordan accession to WTO.
- External markets' strict requirement regarding the quality of agricultural products.
- Weak quality competitiveness of Jordanian products in external markets.
- Improve reputation of Jordanian agricultural products.
- Improve and control the quality of agricultural products.

- Provide farmers with information regarding factors affecting quality of produce.
- Improve products competitiveness in local and export markets.
- Exporters
 - Specifications and Metrology
- MoA
- Universities
 - Three Years
 - Develop laboratories.
- Develop and train staff.

Program 4: Improvement of Resource Use Efficiency

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

- 1- Training and rehabilitation of farmers and agricultural workers.
 - Low level of knowledge and technical skills of farmers.
 - Poor production efficiency due to irrational use of resources.
 - Low quality of agricultural products due to poor application of post-harvest technologies.
 - Train farmers on the use of advanced technologies in irrigation, production and pest control.
 - Train farmers on using environment friendly methods of production.

Areas of fruit trees and vegetables production.

 - MoA
 - MoP
 - NCARTT
 - Three Years
 - Provide staff, extension officers and equipment.
 - Provide funds.
- 2- Monitoring soil pollution.
 - Increasing use of poor- quality irrigation water.
 - Irrational use of fertilizers.
 - Protect soil from pollution.
 - Improve quality of produce.
 - Improve resource-use efficiency.

Areas of fruit trees and vegetables production.

 - MoA
 - NCARTT

Continuous

- Develop laboratories, personnel and equipment.
- Provide funds.

3- Fertigation programs.

- Irrational use of fertilizer.
 - Soil deterioration in some areas resulting from excessive use of fertilizers.
 - Improve crop productivity.
 - Protect resources from pollution.
 - Reduce cost of production.
 - Improve product quality.
 - Improve efficiency of resource use.
- Areas of fruit trees and vegetables production.

- MoA

- MoP

- NCARTT

Three to Five Years

- Train agricultural extension staff
- Provide funds.

Program 5: Enhancing Production Efficiency

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- Enhancing the adoption of advanced production technologies.

- Production does not match market requirements.
 - Low efficiency of agricultural resource utilization especially water.
 - Weak competitiveness of Jordanian products in export markets.
 - Expand the adoption of new production technologies.
 - Improve efficiency of resource utilization.
 - Improve competitiveness of horticultural products.
 - Improve incomes of farmers.
- Areas of fruit trees and vegetables production
- MoA
 - MoP
- Five Years
- Provide soft loans to promote the use of modern technologies in production and post harvest operations.
 - Provide incentives and tax exemptions for using these technologies.

2- Support of export oriented production projects.

- Limited number of export oriented production projects
- The competitive potential of some Jordanian products is not being fully used.
- Improve competitiveness of Jordanian products.
- Improve farmer incomes.
- Facilitate the introduction and use of advanced technology.

Areas of fruit trees and vegetables production

- MoA

- MoP

Three to Five Years

- Provide soft loans for export oriented projects.
- Provide incentives and tax exemptions for these technologies.

3- Development of fruit trees seedlings production.

- Poor quality of fruit trees seedlings regarding diseases, varieties and rootstocks especially in local nurseries.
- Deterioration of many orchards as a result of planting diseased or unsuitable seedlings.
- Produce healthy fruit tree seedlings.
- Produce seedlings that are true to type of variety and rootstock.
- Improve productivity of fruit trees.

Orchards

- MoA

- PS

Three Years

- Provide staff to monitor and control the production of local nurseries.
- Improve agricultural plant quarantines.
- Train agricultural staff assigned for this work.

4- Development of cut flowers and ornamental plants.

- The competitive advantage of Jordan in the field of cut flowers is not fully utilized.
- Poor production efficiency.
- Build an advanced sector of cut flowers and ornamental plants.
- Establish Jordan as a regional center for the production and marketing of cut flowers.
- Attract joint ventures and investments in this developing sector.

All areas

- PS

Five Years

- Enact legislation to support the sector.
- Provide soft loans for investments in the sector.
- Facilitate foreign investments in this area.
- Provide incentives and duty exemptions for the use of new technologies in this sector.

Program 6: Introduction of Special Agricultural Systems for Using Treated Wastewater

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1- Fodder production using treated wastewater.

- Shortage of livestock feed sources.
- Increasing environmental risks from using treated wastewater in vegetable production.
- Increasing quantity of treated wastewater that will be available in the future.
- Expand cultivated areas by using treated wastewater.
- Introduce new agricultural crops to the production system.
- Define water requirements for various crops.
- Evaluate the environmental impact of using treated wastewater.

Areas surrounding wastewater treatment plants

- MoA
- NCARTT
- MoWI
- Universities
- Three Years
- Conduct studies and provide information on the optimal use of treated wastewater and its impact.
- Train the agricultural extension staff in this area.

2- Water harvesting in areas with available treated wastewater.

- Increasing use of treated wastewater that will be available in different areas
- Increasing environmental risks resulting from irrational use of wastewater, especially the risk of increasing soil salinity.
- Improve the use of all available water resources.
- Reduce salt concentrate in treated wastewater used for irrigation.
- Reduce the risk of using treated wastewater.
- Reduce cost of production.

Areas surrounding wastewater treatment plants

- MoA
- MoWI
- MoP
- Universities
- Three to Five Years
- Conduct feasibility studies on implementing water- harvesting projects in areas where treated water is available.

3- Production of industrial crops.

- Increasing environmental risks associated with the use of treated wastewater.
- Increasing quantities of treated wastewater that would be available in the future.

- Lack of projects using treated wastewater for growing industrial crops such as timber, oil crops and others.
 - Promote industrial crops using treated wastewater.

 - Diversify production.

 - Improve farmer income.

 - Protect the environment.
- Areas surrounding wastewater treatment plants
- MoA

 - MoWI

 - MoP
- Three to Five Years
- Provide information on industrial crops that are suitable for growing in different areas such as timber.

 - Study the environmental effects of treated wastewater use and methods of reducing or preventing these effects.

 - Provide soft loans for lead farmers in this new production.

6-5 Marketing Sub-sector

6-5-1 Current Status

Government policies have, long considered marketing only as a supplementary service for production despite the fact that marketing starts before production, its creation of greater economic benefits, and its importance in determining economic returns. Most Government efforts have focused on developing production, which resulted in over-supply of some products, and wasting large quantities of horticultural produce because of imbalance between supply and demand.

i. Supply and Demand

Agricultural production is characterized by an excessive supply of some products by a shortage for others. While the production of vegetables, some fruits, milk, table eggs, and broilers exceeded the demand, there is a great shortage in the production of some basic products, such as cereals, grain legumes, red meat, and livestock feed.

Exports are limited to vegetables, some fruits, live sheep and a quantity of table eggs. Despite the advantage of the early-season of production of vegetables in JV, exports of vegetables and fruits have not exhibited an increasing trend in quantity or value, even to the traditional Gulf markets, because the segments with weaker purchasing power in these markets were the target of exports and failed to enter markets demanding high quality products. Exports of live animals focuses on re-export, with the exception of small quantities of table eggs. Nearly all other products have also failed in entering export markets due to an inability to compete on quality and price.

Jordan imports large quantities of food and agricultural commodities, most importantly, wheat, barley, corn, and red meat. The adoption and implementation of trade liberalization policy in agricultural products, called for by the Economic Reform Program, following membership in the WTO, is expected to lead to further increases in imports, even in surplus commodities, due to the ability of many imported commodities to compete with local production in terms of price and quality.

ii. Marketing Infrastructure

The marketing infrastructure suffers from clear weaknesses, especially in the fruit and vegetables sectors. Fruit and vegetables wholesale markets do not represent real markets, with the exception of the one in Amman, which still lacks the essentials of supply and demand data for price formation. Infrastructure for post-harvest operations also suffers from shortages in the areas of pre-cooling, grading, packaging, refrigerated transport and storage, and processing of products.

There are no wholesale markets for livestock with suitable administrative and service structures, including the biggest and most important livestock market in Amman. As for slaughterhouses, there is a central slaughterhouse run by the Amman Municipality, which is already operating at twice its capacity. Several old slaughterhouses (with limited capacity, and poor hygienic conditions) are still operating in various Governorates and Districts. The PS owns and operates seven broiler slaughterhouses, sufficient to meet the demand of Jordanian.

iii. Competition in Price and Quality

Most indicators show poor competitiveness in the majority of Jordanian agricultural products. With the exception of the JV vegetables, which have strong price competitiveness because of early winter season production, other vegetables, fruit, and cut flowers have not been able to enter export markets. As for livestock, sheep and goats are the only items exported, although a large part of this export is in the form of re-export. The most important factors affecting the competitiveness of Jordanian produce are:

- Small size of production and marketing enterprises
- Absence of producers and/or exporters organizations to integrate these enterprises and assist producers and exporters to use technologies needed to improve quality of produce, reduce production costs and integrate production and marketing activities
- Government failure to provide the needed enabling environment to encourage PS to invest in the marketing infrastructure
- Government failure to provide effective support services (such as market research, agricultural extension, financing and market information).

iv. Distribution Channels and Marketing Margins in the Domestic Market

Despite the fact that marketing channels are short and that the middleman services are simple, the marketing margins are still considered unreasonably high, making the difference between farm-gate prices and consumer prices quite high in most cases. This clearly points to the high benefits gained by the middlemen relative to farmers and consumers, and possibly to the high rate of lost and damaged goods during the marketing process. This indicates a clear deficiency in the marketing system.

v. Government Policies

Ineffective government policies to ensure free market competition in agricultural products were ineffective, either in providing relevant information to all market operators, monitoring and controlling marketing services and products specifications, and enacting legislation promoting free market operations (such as for the sale system at wholesale markets).

Significant weaknesses also exist in the provision of marketing support services, including market research, agricultural extension services, market information, and to a lesser extent, in the area of financing. There are few policies for direct economic market intervention; those that exist are characterized by their temporary nature and instability, such as in the case of protecting local production, or by the unsuitability of the mechanism used for their objectives, such as in the subsidies provided to sheep and goat breeders, which did not reach the target groups in several areas as planned.

vi. Emerging Issues in Trade Liberalization in Agricultural Products

The economic reform programs, implemented by the beginning of 1994, reduced government subsidies on irrigation water, abolished feed subsidies, and abandoned purchasing grain legumes from farmers at pre-announced promotional prices. These programs have also cancelled non-custom trade barriers on imported agricultural products and reduced customs duties. Local produce since then has faced stiff competition from imported agricultural products.

6-5-2 Changes that Occurred in the Marketing Sub-sector

Since 1975 the marketing sector has witnessed several notable developments, the most prominent of which was the appearance of surpluses in the production of vegetables, some fruits, broiler chicken, table eggs, and milk, while other important products, such as cereals, grain legumes, and red meat remained unable to meet local demand.

Imports of products in short supply have increased along with the growth in population and of improved family incomes. Average annual value of imports during the period 1996-2000 was JD 75.4 million for wheat, JD 61.7 million for barley, JD 40.5 million for corn, JD 1.9 million for lentils and JD 6.7 million for chickpeas. Average annual value of imports of livestock products during the same period was JD 13.4 million for live animals, JD 33.2 million for refrigerated and frozen red meat, JD 26.3 million for dried milk and JD 14.9 million for cheese. Even for products in surplus of vegetables and some fruits, imports have increased after removing non-customs trade barriers and reducing customs duties. Imports of fruit and vegetables have continuously increased from 36,000 tons in 1990 to 88,000 tons in 2000.

Exports were limited to vegetables and fruits, followed by sheep (primarily in the form of re-export). The majority of vegetable and fruit exports remained limited to the traditional markets such as the Gulf countries (85 percent), Lebanon (12 percent), and other Arab countries. As for markets of the developed countries, especially the European markets, Jordan exports did not exceed 3 percent of total export, despite the exceptional advantages of the early winter season production from JV.

Exports have failed to compete in the high-income markets in the Gulf countries as well as in Europe, despite big concessions made to exports in the 1997 the European Agreement. This indicates that internal structural problems hinder Jordanian agricultural exports and not the lack of export markets. This is attributed to:

- The small size of export enterprises and companies which prevent them from utilizing new marketing technologies, reducing costs, identifying market niches, developing grading and packaging operations, and improving quality of produce.
- The sector continued to be nearly separated from production, and did not perform its role in orienting production to be based on local and export markets needs and to support interventions to improve the competitiveness of Jordanian produce. Government efforts to establish a national a joint marketing company (from the public and private sectors), did not produce any positive results, even when it was transformed into a wholly owned public company.

Exports did not improve the level of self-sufficiency in food commodities. The value of annual exports of agricultural food commodities during the period 1991-2000 did not exceed a maximum of JD 181.3 million (in 1997), while the minimum value of imports was JD 409.7 million (in 1994). This resulted in a large food gap over the last ten years with a maximum of 152 JD per capita in 1996, and a minimum value of 91 JD per capita in 1994.

There were no major developments in the agricultural marketing infrastructure, other than the establishment of the Central Wholesale Market for fruit and vegetables in Amman, grain silos, grading and packaging stations in JV, and the Tomato processing plants in the Al-Jarda area, which were all annexed to operate under AMPCO after its establishment. The low quality requirements in the local and traditional markets did not motivate producers and exporters to develop grading, packaging, storage, and refrigerated transport facilities. Other than the wholesale livestock market in Amman, which lacks most of the needed facilities, no other such markets were established. No improvements on animal slaughterhouses were introduced, other than the establishment of the Amman Central Slaughterhouse, which now operates at more than double its capacity.

Policies regarding marketing development has also had limited effects, and has failed in several areas, especially in: linking production to market needs, providing incentives to encourage production of crops with competitive export potentials, encouraging large-scale export and processing investments based on contracts with producers, encouraging production new high value crops for export, organizing the marketing sector, and involving farmers organizations and exporters in the development of agricultural and marketing policies.

Little development has occurred in market research, marketing extension, market information, and export promotion, since the establishment of the Agricultural Marketing organization in 1987. Marketing of broilers also remained neglected, with the exception of measures taken to control imports. There have been no efforts to develop the marketing of table eggs after the failure of the Egg Marketing Cooperative Society. The same goes for marketing of fresh milk, where its market relied on Government intervention and mediation between producers and dairy industries to prevent prices from collapsing. Marketing of wheat, barley and grain legumes has also not witnessed any changes, although the policies of purchasing them at encouraging prices have not led to increase in the cropped areas, production, or productivity improvement.

Since 1990, agricultural policies have witnessed major changes, dictated by economic reform programs, the Agricultural Sector Adjustment Program, and the requirements to join the WTO.

The modest support provided to the agricultural sector has been cancelled, protecting local production by custom duties was limited, and the local market was opened for imports exposing local production to stiff competition. In

line with these developments, the Government started to pay attention to the organizational aspects of marketing, and to provide an enabling environment for the PS to play a larger role in marketing. However, no similar attention was given for improving and supporting the marketing services, which free trade rules and the WTO agreement allow within the frame of the Green Box policies and facilities in the field of research, extension, and information. Under the pressure of economic reform programs, the government ignored providing subsidy for the different agricultural sub-sectors, equal to 10 percent of the value of the output of these sectors allowed by WTO agreements.

6-5-3 Problems and Constraints

- Widening marketing margins expressed by large difference between producer and consumer prices, pointing to decreasing producer incomes and a rise in consumer prices in favor of middlemen.
- Increasing price risk of producers, and the weak system of price formation under conditions unfavorable to producers.
- Non market-oriented production and poor relation between marketing and production sectors, and weak mutual dependency among them.
- High post-harvest losses due to limited use of post-harvest technologies, and poor handling of produce along the marketing channels.
- Lack of suitable enabling environment to encourage PS initiatives due to government failure in involving the PS to develop the marketing sector, in maintaining free competition in the market, in providing marketing support services in research, extension, credit and information, and in ensuring the stability and soundness of policies and mechanisms for direct economic intervention in the market, including support, protection, and promotion of investment.
- Small size of the local market, subjecting the marketing of produce to the affects of regional markets, which adds to the challenges facing Jordanian produce.
- Weak competitiveness of Jordanian produce due to the small size of marketing entities and companies, which prevents them from benefiting from the economies of scale of large establishments.
- Poor quality of marketed products in terms of specifications, grading, packaging, and the difficulties faced in maintaining the quality of produce during handling of products.
- Inability of exports to expand in the traditional Gulf markets by targeting higher quality demanding and purchasing power segments, or to enter the European markets that are more demanding of high-value and quality produce.
- Failure of the marketing system to create “future markets” based on contracts between exporters or agricultural industries and producers. This has prevented the development of specialization in production, for processing or export, and kept export and processing of products as activities based on production surpluses.
- Increased competition facing Jordanian products in export markets, following the liberalization of trade in agricultural commodities.
- Increasing competition of imported commodities in local markets and increasing risks unfair competition, fraudulent trade practices, violations in the field of public health and animal and plant health. This is due to government institutions ill prepared in terms of plans, staff, and equipments to implement WTO regulations to prevent such risks.
- Inadequate monitoring and control system of specifications, especially the mandatory ones, the multiplicity of control agencies, and poor integration of food-testing and analysis laboratories.

6-5-4 Objectives of Policies and Strategy for the Development of the Marketing of Agricultural Produce

1. Stabilize prices and improve methods of their formation to reduce marketing margins and ensure a fair distribution of returns among the parties involved in marketing.
2. Provide suitable enabling environment for the private sector to play its role in the development of the marketing sector.
3. Promote market-oriented production, and enhance the relationship between the marketing and the production sectors.
4. Encourage the establishment of production and/or marketing companies of a size that can enjoy the benefits of economies of scale.
5. Improve the competitiveness of Jordanian produce in price and quality.
6. Establish a specialized, export-oriented agriculture to achieve integration between production and marketing depending on contractual agriculture.
7. Increase exports to traditional markets and to markets demanding high-quality goods.
8. Encourage contractual farming for the production of crops for processing.
9. Protect local production from unfair competition of imports, violations in the area of public and plant health and fraudulent trade practices prohibited by the WTO, through good understanding and the preparation of concerned Government agencies to implement the relevant WTO agreements.
10. Improve the performance of Government agencies involved in the marketing of agricultural products, and develop workable mechanisms for coordination and cooperation among them.
11. Ensure participation of private sector organizations involved in agricultural marketing, in the planning for agricultural development, on an institutional basis, by establishing commodity farmers associations.

6-5-5 Strategies to Achieve Objectives

Following is a summary of strategies to achieve the above objectives including programs, projects, and measures (programs and projects are given in matrix shown in matrix No. 5-6).

Objective 1: Stabilize Prices and Improve Methods of their Formation to Reduce Marketing Margins and Ensure A Fair Distribution of Returns Among the Different Parties Involved in Marketing.

Implementation Strategies:

- Organize and develop fruit and vegetables wholesale markets to facilitate improvement of the buying and selling operations, and to ensure that prices reflect supply and demand (Program 2-Project 1).
- Improve and upgrade the livestock market in Amman Governorate and establish other markets to help organize supply and demand and reduce repeated sales (Program 3-Project 1).
- Amend the Law of Municipalities to allow the PS to own and operate wholesale markets within municipality boundaries.
- Issue regulations to organize and control post-harvest marketing operations of packaging, containers, storage, transport, and requirements for establishing exporters' workshops.
- Develop and monitor auctions in the wholesale markets to avoid biased operations and to make it more representative of supply and demand forces.

- Establish a permanent committee to supervise the establishment and organization of the wholesale and “popular” and weekly retail markets. The MMRA, MoA, the Amman Municipality, the Farmers Union, middlemen, exporters and experts in the management of wholesale markets should be members of the committee.

Objective 2: Provide Suitable Enabling Environment for the Private Sector to Play its Role in the Development of the Marketing Sector.

Implementation strategies:

- Develop and improve the infrastructure and management of wholesale markets for fruit and vegetables and provide them with needed facilities, including market information systems (Program 2-Project 1).
- Establish new livestock wholesale markets and improve existing ones to organize and facilitate sale operations, and collect and disseminate market information to dealers (Program 3-Project 1).
- Incorporate a provision in the Law of Agriculture to entitle the MoA to license PS organizations working in agriculture.
- Amend wholesale market by-laws to improve their management and involve the PS in their boards of directors.
- Abolish sales tax on production inputs, marketing services, and on sales commissions in wholesale markets.

Objective 3: Promote Market-Oriented Production, and Enhance Relationship Between the Marketing and Production Sectors.

Implementation Strategies:

- Establish a large national company to market horticultural produce (Program 1-Project 3).
- Study markets with high quality requirements, provide information on their quality standards and marketing channels, prepare produce to meet required standards, and promote Jordan’s produce in these markets (Program 1-Project 1).
- Enhance exports to traditional markets and focus on reaching high income groups in these markets, and conduct studies to evaluate demand and requirements for improving exports (Program 1-Project 2).
- Provide market information to exporters, agricultural industries, and middlemen as well as exporters training on market demand analysis and how to respond to it (Program 2-Project 3).
- Activate the role of commercial attaches at Jordanian embassies.
- Establish databases, by agencies involved in marketing of agricultural produce, and establish mechanism for disseminating of information to concerned groups.
- Promote and give incentives for establishing export companies and provide required financing to introduce advanced technologies in their operations.

Objective 4: Encourage the Establishment of Production and/or Marketing Companies of that can Enjoy the Benefits of Economies of Scale.

Implementation Strategies:

- Establish a large national company to market horticultural produce (Program 1-Project 3).
- Establish export enterprises for exports to high quality requirement markets, either as joint activities between the government and the PS; or wholly financed by the government with the guarantee that these projects will be taken up by the PS at a later stage (Program 1-Project 1).
- Initiate projects for enhancing exports to traditional markets to be jointly financed by the public and PS with private sector eventually assuming control (Program 1-Project 2).
- Give agricultural projects the maximum incentives to promote investment, wherever they may be located.
- Exclude production inputs and agricultural equipments from customs and non-customs duties.

Objective 5: Improve the Competitiveness of Jordanian Produce in Price and Quality.

Implementation Strategies:

- Establish a large national company to market horticultural produce (Program 1-Project 3).
- Encourage the private sector to use advanced technologies that reduce costs, improve produce quality and grading and packaging of produce (Program 1-Projects 1,2).
- Control the strict application of methods of safe use of pesticides, especially durations and limits required for safe use (Program 2-Project 2).
- Provide marketing channels leaders with market information and new production and marketing technologies that would help in reducing costs, improve quality and packaging, and train them in this field (Project 3-Program 2).

Objective 6: Establish a Specialized, Export-Oriented Agriculture to Achieve Integration Between Production and Marketing, Depending on Contractual Agriculture.

Implementation Strategies:

- Establish a large national company to market horticultural produce (Program 1-Project 3).
- Promote the introduction of new high value crops for export, based on prior contracts between producers and exporters, and on providing the required support services and post harvest technologies (Program 1-Project 1).

- Promote and support direct relationship between exporters and producers, encouraging farmers to grow specific export crops and encouraging exporters to use advanced contractual arrangement for the production of export crops (Program 1-Project2).
- Disseminate results of marketing studies and research to exporters, advising them on the importance and the role of contractual agriculture in developing exports (Program2-Project3).
- Establish an internationally accredited commission for issuing certificates of quality for agricultural produce, in accordance with technical requirements approved by the international organizations.

Objective 7: Increase Exports to Traditional Markets and to Markets Demanding High-Value Produce.

Implementation Strategies:

- Establish a large national company to market horticultural produce (Program 1-Project 3).
- Produce competitive and high-value crops in demand in developed export markets, and meet these market requirements with regard to grades and packaging (Program 1-Project2).
- Improve the quality and packaging of horticultural exports to the Gulf markets to reach high-income segments of these markets.
- Allocate a site at the Amman wholesale market for the sale of products intended for export without restricting the sale of such produce to the wholesale markets (Program 2-Project 1).
- Ensure farmers compliance to safe use requirements of pesticides in accordance with export market requirements (Program 2-Project2).
- Provide exporters with information on export markets, train them to develop their skills in planning, and preparation and packaging of produce in accordance with export market requirements (Program 2-Project3).
- Allow licensing of trucks as separate from trailers, and licensing trucks of 16.5 m length.
- Supervise conditions of refrigerated trucks to ensure maintaining required conditions during the transport of products.
- Abolish instructions giving priority of transporting fresh produce to Jordanian trucks, and leave it open for competition.
- Follow-up on coordination between the Royal Jordanian Airline and exporters to organize air transport, expand the refrigerated warehouse capacity, established by the Agricultural Marketing Corporation at Queen Alia Airport, and involve the fruit and vegetables producers and Exporters' Association in its management.

Objective 8: Encourage Contractual Farming for the Production of Crops for Processing.

Implementation Strategies:

- Advise agricultural processing companies on the importance of contractual arrangements in reducing cost, improving quality, and decreasing risks (Program 2-Project3).

- Sell the tomato paste factory, owned by AMPCO, to the private sector, or grant it independence to be managed on commercial basis.
- Provide suitable support to the PS to establish and develop agricultural industries, especially through conducting studies on investment opportunities, promoting production of agricultural crops for processing purposes, and adopting promotional policies such as provision of long-term soft loan, tax exemptions, and exempting processing inputs from all duties.

Objective 9: Protect Local Production from Unfair Competition of Imports, Violations in the Area of Public and Plant Health, and Fraudulent Trade Practices Prohibited by the WTO, Through Good Understanding and the Preparation of Concerned Government Agencies to Implement the Relevant WTO Agreements.

Implementation Strategies:

- Establish commodity farmer associations to assume the role of national entities who would put claim against unjust practices used in imports in accordance with WTO regulations in this respect.
- Take necessary measures by Ministry of Industry and Trade, MoA and the Customs Department, to protect the local market from imports, through applying measures allowed by WTO agreements, of Assessment of Safety (AS), Antidumping Practices (ADP), Subsidies and Monetary Compensation (SCM), and Accurate Customs Valuation (ACV).
- Develop laboratories and plant quarantines of the MoA, and provide them with needed human and financial resources and equipment to apply sanitary and phytosanitary agreements (SPS).
- Enhance the capabilities of the Jordan Institute of Standards and Metrology (JISM) in the areas of testing, analysis, compliance with established standards, and in accrediting laboratories, to prevent fraudulent trade practices against consumers and local traders, and to ensure the application of the agreement of Technical Barriers to Trade (TBT)

Objective 10: Improve the Performance of Government Agencies Involved in the Marketing of Agricultural Products, and Develop Workable Mechanisms for Coordination and Cooperation Among Them.

Implementation Strategies:

- Merge Agricultural Research and Extension services in one institution, and incorporate marketing components in research and extension activities
- Expedite the establishment of a “Food Organization” to achieve integration among food laboratories, and/or merge them under one central administration, if possible.
- Provide all needed requirements to improve the performance of the laboratories and of the plant and animal quarantines of the MoA.
- Prepare the MoA to be the Government agency accredited to the European Union to apply the European Requirements of Good Agricultural Practices (EUROGAP).

- Support Jordan Institute of Standards and Metrology to play its role as a national accredited agency to approve technical rules, compliance with adopted standards, and issuance of quality certificates.

Objective 11: Involve Private Sector Organizations in Agricultural Marketing, in the Planning for Agricultural Development, on an Institutional Basis, by Establishing Commodity Farmer Associations.

Implementation Strategies:

- Prepare exporters association to establish new export enterprises targeting high quality requirement markets and/or to improve and develop present enterprises (Program 1-Project 1).
- Encourage exporters to establish export companies capable of reaching high-income groups in traditional markets and/or improve current export activities (Program 1-Project 2).
- Advise middlemen and providers of marketing services and encourage them to establish organizations to maximize their contribution, on an institutional base, to the development of the marketing sector (Program 2-Project 3).
- Establish specialized commodity farmer associations, to enable farmers participations in the agricultural development process through institutional channels.
- Amend legislations of Government agencies that have boards of directors, to increase the PS representation in these boards and enable the organizations to choose their representatives.

5-6 Programs and Projects Matrix:

The following matrix summarizes the suggested programs and projects, highlighting the main components of the projects, including: justification, objectives, target area/group, executing agency and partner organizations, duration and implementation requirements.

Matrix of Marketing Projects

Program 1: Development of Horticultural Exports

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation Requirements

1- Development of horticultural exports to high quality requirement markets. (This project could start as pilot project through the establishment of a promotion center and financing the needed support activities).

- Availability of markets for high-value, high quality products.
- Relative decline of price and quality competitiveness of Jordanian vegetables and fruit.
- The need for increasing the quantity and value of exports.

- Availability of promising export opportunities for Jordan Valley products
- The need for enhancing and improving exports in light of increasing competition in export markets as a result of trade liberalization in agricultural commodities.
 - Provide products of high quality and value.
- Improve product competitiveness in quality and price.
- Increase quantity and value of exports.
- Access markets that have high quality requirements.

Farmers and exporters using advanced production and marketing technologies or ready to use them.

- MoA
 - Exporters Association
 - MoP
 - MoF
- Five Years
- Provide funds.
 - Issue regulations for post-harvest operations.
 - Provide information transfer of research output, extension; and pesticides residue analysis service.
 - Provide required irrigation water in quantity and quality for farmers with contract for producing export products.
 - Provide administrative support and facilitate involvement of the private sector in export planning.

2- Develop the marketing infrastructure for the horticultural exports sector. (Four centers for grading and Packing in Amman, Mafrq, the Jordan Valley and the Southern Ghors).

- Availability of large export opportunities in Gulf markets.
 - Need to improve the competitiveness of Jordan products.
 - The need for increasing quantity and value of exports.
 - The need for enhancing and improving exports in light of increased competition resulting from trade liberalization.
 - Improve grading and packaging operations.
 - Provide on-site services to producers and commodity farmers associations.
 - Establish direct relation between exporters and producers.
 - Provide products that are competitive in price and quality.
 - Direct Jordan's exports to high-income groups in external markets.
 - Increase quantity and value of exports.
- Producers and exporters of horticultural crops.
- MoA

- PS

- MoF

- MoP

Five Years

- Provide funds.

- Develop market information and research, extension services, and pesticides residue analysis.

.

3- Establish a large national company for the marketing of horticultural produce.

- Poor quality of marketed produce.

- Increasing marketing costs.

- Inadequate grading and packaging facilities.

- Small marketing enterprises do not benefit from the economies of scale of large projects.

- Absence of export companies that operate on the basis of advanced contracts with producers.

- Improve the quality of exports.

- Reduce export costs.

- Improve the grading and packaging operations.

- Increase the competitiveness of the products,

- Establish specialized agricultural production for export based on production contracts.

- Increase the value and quantity of exports.

- Improve Jordan's chances of entering new markets.

- Farmers

- Exporters

- MoA

- MoP

- MoF

- PS

Two to Three Years

- Carry out technical and economic feasibility study for the establishment of the company.

- Provide needed technical and administrative support.

- Facilitate the participation of the private sector in project implementation.

Program 2: Development of the Local Marketing for Horticultural Produce

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation Requirements

1- Develop the wholesale markets of Amman, Irbid and Zerqa.

- Lack of daily and timely information needed by farmers, middlemen and dealers in the market.
- Available daily information is not disseminated to potential users.
- Poor transparency and accuracy of market transactions and in the auctioning system.
- Poor organization, administration, security and customer services in the markets.
- Improve market information and ensure its timely dissemination.
- Improve the conditions of price formation and auction setting.
- Sell on the basis of weight.
- Designate areas for products intended for export.
- Allocate part of the markets fees for an agricultural developmental fund to assist farmers in case of natural disasters, and support projects that serve the vegetable and fruit production.
- Farmers
- Exporters
- Sale agents
- Retailers
- Amman Municipality
- MOMRE
- IM
- ZM
- MoA
- GFA
- WTA
- ES

One Year

- Provide funds.
 - Issue a new by-law for wholesale markets.
 - Establish a permanent committee to supervise the establishment, management, and organization of wholesale markets.
- 2- Safe use of pesticides.
- Increased production costs due to irrational use of pesticides.
 - The negative impacts of chemical residues on marketing products in local and export markets.
 - The increasing dangers of environmental pollution due to improper use of pesticides.
 - Avoid health risk for farmers, consumers and negative impact on national exports.

- Provide an agricultural extension capable of applying safe use of pesticides.
- Protect public health and the environment.
- Enforce the requirement of Maximum Residue Level (MRL) of pesticides and their safe period.
- Farmers and suppliers of agricultural materials
- Agricultural Extension officers
 - MoA
- NCARTT
- WTA
- ES
- GFA

- Provide funds.

- Develop market information and research, extension services, and pesticides residue analysis.

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3- Extension programs for marketing channel leaders.

- Low performance and impact of marketing service in the fields of enhancing exports, processing, grading, packaging, storage and transport of horticultural produce.

- Need to introduce new technologies to improve the marketing services, reduce marketing costs, and improve product quality.

- Weakness of the agricultural extension services in the field of marketing.

- The importance of establishing large private companies to provide improved marketing services on a sound technical and economic basis.

- Establish and develop a marketing extension core.

- Encourage the application of marketing technologies to increase the competitiveness of Jordanian products.

- Disseminate marketing information and advanced technologies through proper channels.

- Encourage the private sector to establish units for providing marketing advisory services.

- Pioneer farmers

- Pioneer middleman

- Pioneer exporters

- Transporters

- Grading, packaging and storage agents.

- Marketing extension agent.

- MoA

- PS.

2-3 years

- Provide funds.

- Restructure the agricultural extension service at the MoA.

- Merge the research and extension services.
- Increase financial allocations for the research and extension marketing programs.

Program 3: Development of Marketing of Live Animal and Livestock Products

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation Requirements

1. Development of wholesale markets for sheep and cattle.

- Lack of livestock wholesale markets with suitable infrastructure.
- Failure of the existing system to organize the sales operation and to allow price formation on the basis of supply and demand.
- Lack of permanent and accurate information on trade in livestock.
- Unavailability of services for livestock including water, feed and of sanitary facilities in the wholesale markets.
 - Reduce market margins.
- Produce more detailed and accurate data on supply and demand on live animals.
- Improve the efficiency of marketing and extension services provided to farmers.
- Encourage investment in complementary activities at the markets such as processing organic wastes.
 - Cattle breeders.
 - Cattle traders.
- Municipalities of Amman, Irbid, Zarqa, Mafraq and Karak.
- Municipalities of Amman, Irbid, Zarqa, Mafraq and Karak.
- MoA

Three Years (Starting from 2003)

- Provide funds.
 - Setting-up systems for market management and operations.
- #### 2. Construction of a new Amman Central Slaughterhouse.
- Low capacity of the existing slaughterhouse.

- Sanitary problems caused by overloaded capacity of the existing slaughterhouse.
- Unlicensed and unsafe slaughtering of animals in the suburbs.
- Provide hygienic conditions at slaughterhouses for protecting consumer health.
- Establish required laboratories.
- Improve the sanitary conditions and general environment.
- Improve quality of marketed meat.
- Meet increasing demand for the services of slaughterhouses.
- Livestock breeders.
- Traders.
- Consumers.
- AM
- MoA
- MoH

Three Years (Starting from 2003)

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5-7 Legislative and Administrative Requirements to Develop the Marketing Legislative Item

Subject Required legislative development

Executing agency

Law for Agricultural

Authorize MoA to license private sector organizations working in agriculture.

MoA

Government institutions with boards of directors

Participation of private sector institutions in 50 percent of BOD of public institutions providing services to the agricultural sector such as NCARTT, ACC. Etc.

MoA

Commercial Attaches

Enhance the role of commercial attaches at main importing countries and countries with promising markets for the Jordanian production to:

- Follow up issues and problems facing Jordanian exports.
- Follow up procedural, organizational and legislative changes in the import markets.

- Provide concerned parties in Jordan with such information in due course.
- Promote Jordanian exports at the official and popular levels.
- Implement other activities needed to strengthen the competitive position of Jordanian products in those markets including exploration of joint investment opportunities.

Ministry of Foreign Affairs

Wholesale markets

Amend the Law of Municipalities for 1955 and by-laws issued in compliance therewith, with regard to the wholesale markets and the Amman central wholesale for vegetables and fruit. This amendment should include the following:

- Permit the private sector to establish and manage wholesale markets within the borders of municipalities.
- Reduce fees collected by the Municipalities for marketing vegetables, fruit and cut flowers, to be in line with the cost of services provided.

MMRA, Greater Amman Municipality

Transportation

- Abolish regulations providing priority to Jordanian trucks to transport fresh produce. It must be left for competition with the foreign transporters because of the poor condition of the refrigerated Jordanian transportation fleet, the sensitivity of fresh products to the transport conditions and increased competition on foreign markets.
- Coordinate with Syria and Turkey to cancel or reduce transit fees on Jordanian refrigerated trucks transiting their land.
- Oblige refrigerated Jordanian and foreign trucks to use thermo-reader logs.
- Subject trucks to undergo a periodical test by a technical committee from the Ministry of Transportation and the association of owners of refrigerated trucks to assure:
 - Their suitability.
 - Compliance with the refrigerated-trucking requirements in terms of cleanliness, isolation, durability, and axes load.
 - Quality of systems to halt air-vibrations.
- Licensing of trucks separate from trailers licensing and licensing trucks of 16.50 m length for trailer and trailed part in order to be able to compete with similar trucking arrangement applied by transport companies in European countries.

Ministry of Transportation

Ministry of Industry and Trade

Vehicle Licensing Department

Organization of the profession

Organize professions in the area of produce marketing and marketing facilities and infrastructure. MoA should have the responsibility of setting detailed conditions for each, including exporters, processors, owners of packing stations, refrigerated stores, transporters and commission agents.

MoA

Subject Required legislative development

Executing agency

Court of agriculture

- Establish a court of agriculture to promptly settle disputes related to agriculture.

Ministry of Justice

Vocational education

- Include agricultural education in the curricula of secondary schools, colleges and universities, and focus on applied agricultural and marketing education in support of academic education.

Ministry of Education

International agreements

- Contact countries that impose transit fees or high customs duties on Jordanian exports such as Romania and Hungary to reduce or abolish these fees. Equal treatment should be applied with some other countries such as Russia, Romania and Hungary

MoA

MIT

Taxes and fees

- Abolish the sales tax on wholesale market commissions.
- Cancel sales tax on the grading, packing stations and refrigerated storage and on export of vegetables, fruit, cut flowers, and medicinal and herbal plants.
- Abolish the sales tax on production inputs upon recommendation by MoA.

Sales Tax

Cabinet

Ministry of Finance

Pollution

- Amend penalties to become more effective.
- Limit the responsibility of pesticides, import and control of handling and use with MoA.
- Apply the MRL procedures on products sold in the local marketing centers.

MoA

Agricultural marketing and processing company

- Privatize cold stores in Qastal.
- Privatize grading and packaging stations owned by AMPCO.
- Sell the tomato paste factory to PS or improve its management through giving it wide autonomous powers.

Cabinet

Investment

- Upon recommendation by the MoA, exempt production inputs and equipment for use in marketing projects with possible multiple uses, from customs duties and sales tax.

Jordanian Corporation for Investment Promotion

Ministry of Finance

MoA

Market information bulletin

- Issue a weekly, monthly, and annual periodical, on local and foreign markets by MoA to cover:
 - Quantities and types of products arriving at the markets.
 - Quantities and types of products exported from these markets.
 - Prices.

- Market information.
- Competitive position of Jordanian products and competing countries in export markets.

MoA

Good agricultural practices

- Enforce legislation concerning the control of agricultural pesticides use, including safe periods.
- Ensure the application of regulations including the mandatory use of farm records.
- Specify a local institution to be accredited by the European Union for the certification of produce quality and the Eurogap conditions.

MoA

Subject Required legislative development
Executing agency

Organize and develop local marketing

- Sales should be by weight.
- Improve display of wholesale products for sale by removing the central umbrellas in Amman Central Wholesale Market and complete the covering of central courtyards and the middle auction area.
- Improve marketing services and other services inside the Amman central wholesale market to include:
 - Information on the number of consignments arriving daily, types and weight of containers, types and kinds of produce, and the area of production, at the level of municipality or governorate, and the quality of produce.
 - Quality control.
 - Safety and security.
 - Public utilities for the public dealers in the market.
 - Organize marketing operations by prohibiting second sale of produce or selling outside scheduled times, especially night selling.
 - Establish an advanced market information system at the Amman central wholesale market and other markets based on the following:
 - Computerization of sales processes to secure transparency and immediate relay of accurate information to market dealers dissemination is to be used as a basis to collect fees, provide statistics and dispute settlement.
 - Connect the system with the national information center.
 - Ensure easy access of interested people to this network round the clock.
 - Disseminate daily and timely information on electronic panels in the markets.

MoA

VII- Enabling Environment and Support Services

The success of the National Agricultural Development Strategy in achieving its objectives depends, to a great extent, on the Government's ability to provide an enabling environment and required support services for its implementation. This will depend mainly on improving the efficiency of the responsible government institutions and in providing the required services to help the PS in assuming its role in development.

The following measures are recommended:

7-1 Developing the role of the Ministry of Agriculture in agricultural development

- Enact a new law for agriculture that focuses on the following:
 - Defining the Government role in the development of the agricultural sector, and the responsibilities and functions of the MoA. The law should be considered as a law for agriculture not a law for MoA.
 - Giving the MoA a direct development role in addition to the functions of organizing, directing and supervising the AS.
 - Assigning MoA the responsibility of preparing agricultural policies and presenting them to the Agricultural Council for consideration, prior to submitting them to the cabinet for approval.
 - Subjecting decisions made by "Higher Planning Council" regarding the use of agricultural land, inside and outside the boundaries of the municipal and village boundaries to non-agricultural use to a prior approval of MoA.

- Giving the MoA the authority to license the PS organizations operating in the AS, other than cooperative societies.
- Assigning MoA the responsibility for on-farm water management and its participation in the planning of irrigation projects.
- Participation of MoA in the preparation of specifications and conditions for the use of marginal and treated wastewater in agriculture.
- Revising the Ministry's organizational structure to:
 - Reorganize the administrative units in light of the new responsibilities that will be assigned to the Ministry by the anticipated new Agricultural Law.
 - Assign specific and clear responsibilities and functions for the administrative units to enable them to deal with the rapid changes in the AS, and to implement the NSAD.

7-2 Strengthening Cooperation and Coordination Among Agencies Concerned with Agricultural Development

- Assign the position of the chair of the Agricultural Council to the Prime Minister.
- Define the Agricultural Council duties more clearly, and give it the authority to carry out these duties.
- Provide the Agriculture Council with the operating mechanism it lacks, through incorporating an article in the council by-law, regarding the establishment of an administrative unit and permanent committees to serve the council, defining their responsibilities, and functions.

7-3 Rural Financing and Agricultural Credit

Agricultural financing is currently limited to what the Government provides through the Agricultural Credit Corporation (ACC). The institution was established by virtue of Temporary Law Number (50) for the year 1959, through the merging of three credit institutions: the Agricultural Credit Bureau, the Cooperative Development Department and the Agricultural Bank into one corporation, the "Agricultural Credit Corporation." Since 1989, the ACC has become the only official source for providing agricultural loans to farmers, when the Cooperative Bank and the Jordan Valley Farmers Association ceased to provide loans due to their unsuccessful lending experience.

The ACC paid-up capital is JD 24 million, and its reserve capital is JD 12.5 million. External financing resources, include loans and credit facilities from local sources of about JD 46 million, while external loans is about JD 28 million. By the end of 2000, farmers' outstanding loans reached about JD 105 million for 65,000 creditors, out of a total of JD 300 million that the Corporation lent since its establishment

During the last few years, the ACC started to face real challenges that would affect its sustainability, unless dealt with on sound basis. Some of the most prominent challenges are:

- The government's decision, over the last decade, to waive interest on loans (totaling around JD 27 million over the last decade) and to reschedule loans regardless of the negative impact of these actions on debtors' commitment to pay, the Corporation's relations with international financing organizations, and the Corporation's future as the only source of agricultural credit.

- Limiting the ACC role to the provision of agricultural loans, which are generally characterized as high-risk loans, especially under the agricultural conditions in Jordan. The ACC has not yet financed non-agricultural rural developmental activities and has not been involved in other financial services and activities that could secure rewarding returns for the Corporation.
- Insufficient staff specialized in banking and financial services, especially at the senior administrative levels.
- In order for the Corporation to overcome problems and obstacles it faces, and to continue providing the needed financing for the agricultural and rural development projects (now and in the future), it is suggested to convert the ACC into an independent “Bank for Rural Development”, under the supervision of the Central Bank of Jordan, by the end of the year 2004. To achieve this, it is suggested that the government take the following measures:
 - i. Invite the PS to participate in the Corporation's capital, through the sale of part of its paid-up capital of JD 24 million to the PS, or through increasing the Corporation's Capital to JD 40 million. To encourage the PS to take shares in the bank's capital, the government should consider providing attractive incentives, including selling the PS special stocks, with a government's guarantee of a minimum level of returns during the first years of operation.
 - ii. Support the financial position of the Corporation through its assuming other financial services needed by rural population, such as opening current and savings accounts; issuing and clearing checks, money transfers and currency exchange, which are expected to secure high financial returns that would improve the Corporation's financial position.
 - iii. Update credit rules and regulations, decrease the cost of transactions and consider profit making, attract savings and consider the rate of loan repayment as the criteria to evaluate the Corporation's achievements and its branches, rather than the size of loans issued.
 - iv. Support the ACC staff with banking expertise, and train agricultural engineers working at the Corporation to perform the technical work and loans supervision.

7-4 Information and National Agricultural Statistics

Accurate and reliable agricultural information and statistics is the cornerstone of proper agricultural development planning and policy-making. Furthermore, providing accurate information to parties working in the agricultural sector (public and private, individuals and establishments) is critical to helping them make decisions on an informed, scientific basis. Information and agricultural statistics still fall short of meeting the required level for several reasons, including:

- The existence of multiple agencies that collect and disseminate agricultural data and statistics, often resulting in contradicting and unreliable information, thus confusing users, and limiting the opportunities of proper planning for agricultural development.
- A shortage of the agricultural and marketing data required to follow-up development in the agricultural sector, to enable individuals, organizations and institutions working in agriculture and agribusiness to take proper decisions based on timely, and reliable information. Agricultural statistics and data, at the level of agro-ecological zones, which generally form the base for agricultural development planning, are not available, except for the JV area.
- Lack of cooperation and co-ordination among organizations concerned with the collection and provision of agricultural statistics and data, whether at the level of preparation of programs or field-work, and between these organizations and the users of the information in the public and private sectors.

In order to provide accurate and reliable agricultural statistics and information, it is suggested to establish a permanent “Committee of Experts” for agricultural statistics composed of representatives from the General

Department of Statistics, the MoA, MoWI, MMRA, the Lands and Survey Department, and three experts representing the users of agricultural statistics, from the private and public sectors. This committee should be responsible for defining data and information needed to formulate AD policies and strategies, preparing the scope of work for collecting information, including designing the sample, the survey questionnaires, the agencies responsible for (or participating in) collecting information, and reviewing statistical information before its adoption and release. The Committee should take the following issues into consideration:

- Expanding the database to include all information needed to follow up developments in the AS, and to enable the Government to introduce changes to agricultural policies and programs based on reliable and accurate information.
- Revisiting the methodology used for collecting information, to ensure that such information would reflect, through its comprehensiveness, accuracy and details, the economic, social, and environmental significance of resources, crops, and agribusiness, on which information is collected, and would meet user needs in the public and PS.
- Preparation of agricultural data and information at the level of agro-ecological zones such as the rainfall distribution in rain-fed areas, soil type, quality of irrigation water, and climatic parameters in irrigated areas, in addition to providing it on at administrative levels.
- Reviewing and standardizing the terms and definitions used in preparing agricultural information and statistics for all government institutions.
- Mandate General Department of Statistics, to prepare and implement a training program for statistical staff at ministries and departments responsible for the collection of agricultural information.
- Requiring each agency responsible for data collecting to collect it in accordance with the methodology prepared by the "Committee of Experts", using the forms prepared for this purpose.
- Designating the General Department of Statistics as the sole source of providing national agricultural statistics to avoid duplication and/or contradiction.
- The Director General of the Department of Statistics and the Secretary General of the Ministry of Agriculture should be the reference to the "Committee of Experts" for agricultural statistics.
- Incorporating an article in the draft law for agriculture for the year 2002, regarding the right of the MoA to collect agricultural information for research and study purposes needed for preparing special reports that are not in contradiction with DOS data.

7-5 Agricultural Research, Technology Transfer and Extension Services

The contribution of agricultural research output to agricultural development was below the expected level despite the establishment of a special department at the MoA for agricultural research and extension in the 1950s, and colleges of agriculture at three government universities, and carrying out numerous studies and research activities by many organizations.

Fragmented national efforts and poor coordination among research institutions has resulted in overlap and duplication of some research activities. Weak interest in research and agricultural extension is reflected in the limited financial and human resources allocated for the development of the institutional and technical capacities of research and extension services. Among the main problems and constraints that have faced the efforts to develop agricultural research and extension in Jordan over the last fifty years are:

- Insufficient numbers of highly qualified researchers with varying expertise at the National Center for Agricultural Research and Technology Transfer (NCARTT). This shortage has limited the ability of the center to contribute to achieving the objectives of the agricultural development strategies.
- Inability of NCARTT to retain holders of high academic degrees due to low salary scale and remuneration package.
- Shortage of qualified intermediate technical human resources in nearly all institutions, and specifically at universities.
- Shortage of financial resources allocated by different organizations, which weakens their ability to implement programs requiring long-term research, or to upgrade their laboratories to meet scientific requirements and developments in research.
- Absence of a body to coordinate research and agricultural extension efforts at the national level has resulted in the fragmentation of research and extension efforts.
- Research outputs of some research institutions is not linked to AD plans, which reduces their contribution to solving the problems facing the AS.

As future agricultural development in Jordan will depend mainly on the contribution of agricultural research and extension in increasing productivity, reducing production costs, and improving the quality of produce, and in view of the limited availability of resources, it is recommended to re-examine the structure of the national agricultural research system, the agricultural extension service, and means of technology transfer to achieve the objectives of the NSAD based the following recommendations:

1- Establishing a National Commission for Agricultural Research and Extension” composed of government and non-government organizations, mandated to carry out research activities, technology transfer and agricultural extension. The Commission should be composed of representatives of: the General Corporation for Agricultural Research and Extension (to be established), Colleges of Agriculture, the General Corporation for the Protection of the Environment (or the Ministry of the Environment when established), the Royal Scientific Society, the Higher Council for Science and Technology, the Jordan Valley Authority/Ministry of Water and Irrigation, and any research center established in the future.

The commission should assume the following mandate:

- Operate as a focal body to coordinate national efforts in the areas of agricultural research, technology transfer, and agricultural extension services.
 - Develop a national strategy for agricultural research and extension that contributes to the achievement of agricultural development objectives, and follow-up its implementation. Use the national strategy for research and agricultural extension as the basis for financing research and extension activities to be implemented by institutions participating in the Commission.
 - Support the national efforts to develop the academic and technical abilities of the staff of member institutions in the Commission, to enable them to efficiently deal with changes and developments affecting the development and growth of the AS on the local and international levels.
 - Provide necessary financial resources to develop infrastructure for all institutions members in the Commission to cope with research requirements, and promote teamwork based on multidisciplinary approach.
- 2- Develop the NCARTT, including its laboratories and agricultural research stations, into a new organization to be called "the General Corporation for Agricultural Research and Extension."

The Corporation is to be managed by a governing council representing members of the National Commission for Agricultural Research and Extension (to be established), the Jordanian General Farmers Association, deans of

scientific research colleges at public universities, researchers with distinguished expertise, and producers representing the different agricultural production sectors.

- The Corporation shall operate according to a special law granting it financial and administrative autonomy.
- The Corporation, in accordance to its law, will assume the following duties:
 - Conduct applied research, publish and transfer research outputs to target farmer groups, assist in their adoption, and follow-up on their implementation.
 - Conduct economic and social studies related to the development of AS.
 - Finance and follow up the implementation of research, technology transfer, and agricultural extension projects and activities included in the National Strategy for Agricultural Research and Extension, adopted by the National Commission for Agricultural Research and Extension.
 - Organize extension and training programs for farmers, and train research and extension staff on advanced methods of research, technology transfer, and agricultural extension, through scholarships and training courses at national and foreign universities.
 - Provide laboratory and analyses and testing services that cannot be undertaken by the PS.
 - Conduct research and studies related to the development of production systems that improve the economic use of agricultural resources while sustaining their productive capacity and protecting the environment.
 - Issue financial and administrative by-laws, guided by University by-laws, defining the bases for appointing the General Director of the Corporation, his/her qualifications, and the bases for appointing and promoting researchers and defining their scientific ranks.
 - Issue by-laws to define the following:
 - Basics for preparing, approving, and implementing corporation activities. The national strategy for agricultural research and extension is to be considered as the reference for all of the corporation's research and extension activities.
 - Designate the Corporation as the focal point for all agricultural research and extension activities at the national level.
 - Define methods of participation of local research and agricultural extension institutions (and their researchers) in conducting research and agricultural extension activities, and in using the facilities available through institution members of the National Commission for Agriculture Research and Extension.

7-6 Measures to be Taken by Government Institutions other than the MoA in Support of the NSAD

It is recommended that the following government institutions take needed measures to facilitate the implementation of the NSAD, each within the scope of its responsibilities and mandate.

i. The Ministry of Water and Irrigation

- The Ministry is to continue assuming the responsibilities of water-resource use and planning, water-resource development, protection of national water rights, protection of watershed areas, executing irrigation projects, and ensuring the sustainability of supplying irrigation water for these projects.

- The Jordan Valley Authority is to continue to develop and protect water resources in the Valley, construct and maintain irrigation projects and irrigation water distribution systems up to the farm-gate, either through its staff, or through management contracts with the PS.
- Cooperate with MoA for the agricultural development of watershed areas.
- The MoA should, as soon as possible, assume the responsibility of on-farm water management in JV and the Highlands.
- Confirm the joint responsibility of the MoA and the MoWI in the planning of irrigation projects in all areas of the Kingdom, including wastewater treatment and marginal water projects and defining their uses in agriculture.
- Confirm the joint responsibility of the MoA and MoWI in determining water requirements of agricultural crops, and in determining the annual water budget accordingly.

ii. The Ministry of Municipal, Rural Affairs, and the Environment

- Prepare plans for land use after completing land surveys and soil classification, and preparation of an appropriate land-use law.
- Adopt regional planning as a basis for determining land use for urban expansions, the establishment of new villages avoiding encroachment on prime agricultural land, and ensuring protection of the environment.
- Halt the expansion of municipal and village boundaries till the adoption of a land-use law, adopt accurate criteria for land classification within rural and municipal boundaries, and define the directions of future expansion of these boundaries.
- Amend the Law for Cities, Villages, and Building Planning in the year 1969, to include MoA as a member of the Higher Planning Council, and the Planning Committees at different levels.
- Strict application of legislation regarding building on agricultural land and on the non-provision of public services to such buildings to prevent their expansion and their development into villages causing negative impact on agriculture and the environment.
- Amend the Law of Municipalities to allow the PS (companies and NGOs) to own and manage wholesale markets within municipal boundaries, as is the case outside these boundaries.
- Amend the Law of Municipalities to entrust the MoA with the technical aspects of wholesale markets operations, and to enforce quality requirements and packaging of products, in Amman and other municipalities' wholesale markets, whereas municipalities would be responsible for administrative and financial management of the markets.
- Amend the by-laws of the wholesale markets for fruit and vegetables to allocate part of market revenues to the agricultural development fund to be established as stipulated in the law of the agriculture.

iii. The General Corporation for the Protection of the Environment

- Amend the Corporation's Law to allow it to effectively participate in decisions made regarding the approval of development programs and projects in all sectors of the economy, in order to ensure their compliance with the environmental safety requirements.
- Study the possibility of granting full autonomy to the Corporation with direct linkage to the Prime Minister's office or establishing a Council for the Environment, considering the existence of several agencies concerned with the issues for which the corporation is mandated.

iv. The Ministry of Trade and Industry

- Designate the Ministry of Trade and Industry as the focal agency for dealing with issues related to WTO agreement and other regional agreements. The Ministry has already established a Directorate for trade policies, a Directorate for the protection of national products, and enacted the “Law of National Production Protection” as well as related by-laws. It is proposed that the Ministry assumes the following responsibilities:
- Exploit windows of opportunities provided by WTO, regional and international agreements through establishing programs to support and provide incentives to farmers in areas of environmental and social concerns, such as improving the quality of irrigation water, the protection and conservation of natural resources, social and economic development of rural areas, fighting rural poverty, and protecting the environment.
- Study international agreements to define windows of opportunities that allow agricultural subsidies, areas for possible support and the means to benefit from them to reinforce the role of the AS in providing food and enhancing social security.
- Expand export opportunities, reduce the challenges of imports, ensure compliance with SPS regulations and avoid of fraudulent practices and unfair competition practices through expediting the following measures:
- Establish a “Permanent National Committee” from the relevant public and PS organizations, headed by the Ministry of Industry and Trade, to prepare a national plan for limiting losses and increasing gains from joining the WTO. Sectoral committees should be established under the national committee, including a special committee for Agriculture to be headed by MoA.
- Establish a “committee of experts” to follow up on the 1994 GATT agreement and the agreement on agriculture, to include representatives from the MIT, MoA, and PS institutions. The committee should be responsible for studying both agreements, exploring privileges and exemptions from which Jordan can benefit as a developing and net food importer country. The committee should undertake all necessary actions to maximize benefits from these agreements, and study the need for enacting new legislations concerning Jordan's relations with the WTO or amending current legislations.
- Cooperate with MoA to study the impact of joining the WTO on the AS and the expected challenges, and prepare scenarios for how to deal with them. Submit results to the Permanent National Committee and the Committee of Experts so that work can begin.
- Establish a Permanent National Committee for WTO negotiations on agriculture, to include representatives from MIT, the MoA, Jordan Export Development Corporation, JISM, and the PS. The committee should be responsible for all negotiations, and should submit its reports to the agencies it represents and to the Permanent National Committee and the Committee of Experts.

v. The Ministry of Planning

- Secure the needed support for AD programs and projects, including external technical assistance by donor governments and agencies and international organizations.

vi. The Ministry of Labor

- Review the law of labor to cover permanent agricultural workers by the social security program, to ensure that they receive the same privileges as those in other sectors of the economy.

vii. The Universities

- Review academic programs and training activities at faculties of agriculture to meet the requirements of AD, and qualify graduates for practical application of knowledge.

viii. The Jordan Institute for Standards and Metrology (JISM)

The JISM law has been amended to extend its responsibilities to meet the requirements of trade liberalization and WTO agreements, to be the accredited national agency to approve the technical standards, implement claim measures, and issue quality certificates for export products. Furthermore, its organizational structure was upgraded to include administrative units required to carry out the institute's responsibilities. It is essential for JISM to:

- Complete the standard specifications for the remaining agricultural products and for treated wastewater use for irrigation purposes.
- Establish a suitable mechanism to apply these standards.
- Develop the institute's laboratories, and train its staff.
- Become member of relevant international organizations
- Establish points of information and reporting regarding its activities.

ix. The Ministry of Finance/Land and Survey Department

- Review the by-laws allowing the partition of agricultural land among partners into parcels of 4 du.

x. The Ministry of Finance/Customs Department

- Develop its institutional capabilities to implement the WTO agreement regarding Actual Valuation of Customs (AVC).
- Coordinate with the Department of Statistics to ensure the accuracy of data regarding exports and imports of agricultural commodities in terms of quantity and value.
- Follow-up development on the ASYCUDA systems to simplify procedures and control of foreign trade statistics.

7-7 Development of Private Sector Institutions and Organizations in Support of NSAD

- Establish farmer commodity associations for the production and marketing of the following products: olives, citrus fruit, apples, stone- fruits, vegetab les in the JV and the H igh lands, cereals and grains legum es, ornam ental plants and cut flowers, sheep and goats, broiler chickens, table eggs, grapes, date palm, and dairy cows.
- Amend the current Law of the General Farmers Union to be composed of a general assembly, comprising all members of the Boards of Directors of the Farmers Commodity Associations, and an Executive Board of Directors composed of Chairmen of the farmer commodity associations.
- Prepare the required legislation to establish and organize the work of the farmer commodity associations, and the General Farmers Union, and provide the needed technical and financial support to these organizations within the provisions allowed by WTO agreement.
- Establish a Jordanian Chamber of Agriculture.

Matrix of Main Measures to Provide Enabling Environment and Support Services Needed for The Implementation of the Strategy

No.

Measure

Executing Agency

Page

1.

Enact a new agricultural law that gives the Ministry of Agriculture a greater development role.

Ministry of Agriculture

2.

Review the organizational structure of the MoA in light of the new law.

Ministry of Agriculture

3.

Restructure and reactivate the Agricultural Council.

Council of Ministers

4.

Transform the ACC into a Rural Development Bank.

Council of Ministers

5.

Establish a Permanent Committee of Experts to develop and improve agricultural information and statistics.

Ministry of planning

DOS

6.

Restructure agricultural research and extension services.

Ministry of Agriculture

Council of Ministers

7.

Enhance coordination and cooperation between MoWI and MoA in the field of water use in irrigation.
Ministry of Water and Irrigation,

Ministry of Agriculture.

8.

Review the Jordan Valley Authority by-laws to enable it to carry out responsibilities stipulated in the new Jordan Valley development law.
Jordan Valley Authority

9.

Define land use for various purposes and enact a new law for land use.
Ministry of Municipal, Rural Affairs and the Environment

10.

Ensure compliance of the relevant organizations to the laws and regulations related to the building on agricultural land.
Ministry of Municipal, Rural Affairs and the Environment.

11.

Amend the by-laws of fruit and vegetable wholesale markets allowing the private sector to own and manage wholesale markets within the municipal boundaries, and give the Ministry of Agriculture a role in the management of these markets.
Ministry of Municipal, Rural Affairs and the Environment.

12.

Give the general cooperation for the protection of the environment more power in protecting national resources and the environment.
Ministry of Municipal, Rural Affairs and the Environment

13.

Protect local market, expand export opportunities and reduce challenges of imports to local production.
Ministry of Agriculture

Council of Ministers

14.

Allocate a greater part of the assistance offered by donor countries for providing technical assistance and expertise for the agricultural sector.
Ministry of Agriculture

Ministry of Planning

15.

Review the labor law.
Council of Ministers

16.

Develop the educational and practical training programs at the faculties of agriculture.
Universities

17.

Enhance the potentials of the JISM to become an effective national institute in approving technical regulations, ensuring compliance with issuing certificates of quality and accrediting laboratories.

Ministry of Trade and Industry.

Institute for Standards and Metrology

18.

Review by-laws allowing the partition of agricultural land into parcels of 4 du.

Department of Lands and Survey

Council of Ministers

19.

Improve export and import data, and the application of the Actual Evaluation of Customs Agreement and ASYCUDA.

Custom Department

20.

Establish commodity farmers associations.

Ministry of Agriculture

Council of Ministers

21.

Reestablish the Farmers General Union on the basis of Commodity Farmers Associations.

Ministry of Agriculture

Council of Ministers

22.

Establish a Chamber of Agriculture.

Ministry of Agriculture

Council of Ministers

VIII- Expected Economic, Social and Environmental Returns

8-1 Economic Returns

The direct economic returns from the implementation of the National Strategy have been estimated for the main production sectors that showed large potentials for increasing efficiency, productivity and quality of produce. These included vegetables, fruit, olives, cut flowers, cereals, forage and small ruminants sectors.

Estimates are made on the assumption that 50 percent of farmers will increase their productivity to the level already achieved by leading local farmers during the first five years of the implementation of the strategy, increasing to 70 percent of farmers by 2010.

i. Fruit Production

- Fruit Production in the Irrigated Highlands (Stone Fruit, Apples and Grapes)

- An increase in fruit production from about 50 thousand tons at present to 140 thousand tons by 2010, which would result from an expansion in the area planted with fruit trees from 38 thousand du to 70 thousand du in replacement of areas cultivated with vegetables and olives in unsuitable environments, and from an increase in average productivity from 1.3 tons/du to 2 tons/du.

- An increase in the economic life of fruit trees from (12-15) years to (17-20) years.

- An improvement in the quality of produce and an increase in the percentage of first grade products from 30 percent to 70 percent.

* Fruit Production in the Jordan Valley

- Citrus

- An increase in the production of citrus fruits from about 162 thousand tons (at present) to about 216 thousand tons in 2010, as a result of increasing productivity from 2.7 tons/du to 4 tons/du.

- Early Grapes

- An increase in the cultivated area of grapes in JV from 2.5 thousand du to 20 thousand du as part of the national effort to expand the high-value crop cultivation in replacement of low-return surplus crops, and the expected increase in exports, based on the existence of an important marketing niches in European markets from mid-May to mid-June.

- Date Palm

An increase in the cultivated area of date palm in JV from 4 thousand du (at present) to 20 thousand du, as part of the efforts to introduce high-value crops that also require less water and soil quality in the JV.

ii. Vegetables Production

- Vegetables Production in the Highlands

- An increase in the area of protected agriculture from 5 thousand du (at present) to about 20 thousand du by 2010, which will increase productivity in these converted areas by about 400 percent, and improve quality of products.

- Vegetables Production in the Jordan Valley

- An increase in the area of protected agriculture, under plastic houses, from 9 thousand du to 35 thousand du by 2010, and from 6 thousand du to 15 thousand du under plastic tunnels, which will increase productivity in these converted areas by about 400 percent and improve quality of products.

iii. Exports of Horticultural Produce

- Fruit and Vegetables

- An increase in the annual exports of fresh fruit and vegetables to the traditional Gulf and neighboring markets from 382 thousand tons to 630 thousand tons by 2010, to East-European markets from 8.4 thousand tons to 60 thousand tons, to West European markets from 2.2 thousand tons to 30 thousand tons, and to other markets from 4 thousand tons to 30 thousand tons.

- An increase in the total value of annual exports from JD 72 million to JD 215 million by 2010 at 2000 prices.

- Olive and Olive Oil

- A 50 percent increase in olive productivity, an improvement in the quality of products, reducing the production cost by implementing the proper agricultural practices, and limiting cultivation of olives to the suitable agro ecological environments, will improve competitiveness in export markets and increase exports to 10 thousand tons by 2010, at an estimated value of about JD 5.6 million.

- An improvement in the processing and marketing of olive oil. Export of olive oil is expected to increase from 300 tons(at present) to 2250 tons by 2010, at a value of about JD 3.5 million.

- Cut Flowers

- An increase in cut flowers production from 50 million flower to 100 million flower by 2010, and an increase in the annual exports from 1.5 million flower to 30 million flower, at a total value of about JD 7.5 million.

iv. Field Crops

- An increase in the productivity of 740 thousand du of field crop area to reach 200 Kg/du for wheat, 150 Kg/du for barley, 100 Kg/du for lentils, and 120 Kg/du for chickpeas, as a result of introducing and adopting new production technologies.
- Average total production of field crops is expected to reach 119 thousand tons, of a total value of about JD 16 million.
- It is also expected to gradually stop cultivating cereals in about 590 thousand du of marginal areas not suitable for the cultivation of field crops and their use for fodder production or as rangeland. Value of feed production in this area is estimated at JD 6 million annually.

v. Animal Feed Production

The implementation of strategies, programs and projects aimed at rangeland rehabilitating, developing new rangelands, and introducing improved rangeland management systems will result in:

- A 10-15 percent increase in rangeland productivity.
- An estimated production of about 20 thousand tons of green forage from cultivating 100 thousand du with spineless cactus in areas with low rainfall.
- Use of agricultural by-products (straw, olive cake, banana leaves, tomato waste, and poultry mats etc.) to produce 200 thousand tons of feed mixes for a total value of about JD 12 million.
- Production of about 70 thousand tons of green forage using wastewater, at a total annual value of JD 1 million.

vi. Small Ruminants

- A substantial increase in the productivity of sheep and goats as a result of increasing fertility, the number of twins, and the average weight of slaughtered animals. This will be achieved through improved animal health care, herd management and genetic improvement.
- The net returns of small ruminants (1.6 million sheep and 600 thousand goats) is expected to increase from about JD 9 per head of sheep to JD 22, and from about JD 22 per head of goats to JD 40, and a total increase in the value of annual production in this sector from JD 28 million at present to JD 59 million in 2010.

8-2 Social Returns

- Income of farmers and livestock breeders is expected to increase as a result of improved agriculture productivity, the introduction of high-value crops in the cropping pattern and of improved quality of products.

- Migration from rural to urban areas will greatly decline as a result of increased job opportunities that would be created by a modern agriculture sector, by agribusiness activities and services and by training rural population, especially the young men and rural women to carry out income generating projects.
- Gradual reduction of expatriate labor in the AS.
- An increased participation of farmers and rural communities in the planning and implementation of rural development projects through their own organizations. This will be positively reflected on the speed and efficiency of implementation of rural development programs, and on farmer support of government policies and interventions.

8-3 Environmental Returns

- Halting unplanned expansion of urban areas on agricultural land, and of violation of current legislation prohibiting building on agricultural land, through denial of services to these buildings.
- Combating desertification and protecting, the environment, the agro-biodiversity and agricultural resources, to secure requirements for sustained development. This will be attained through protection and development of forests and of natural rangeland, especially rangeland with high productive potential (about 10 million du) through the establishment of rangeland areas cooperative societies under the supervision of MoA, the protection of remaining rangeland through organizing grazing, the establishment of additional range reserves and overcoming problems with local communities regarding the use of rangeland resources.
- Conservation of agricultural land through the control of soil erosion in mountainous areas with high slopes, through improved agricultural practices and water harvesting structure.
- Mitigating the environmental risks of treated wastewater through its use in agriculture, which is expected to reach 177 million cubic meters by 2010.
- Protection of the rural agricultural environment, creating a cleaner and more beautiful rural area, which will promote eco-tourism.
- Ensure environmental safety, protection of bio-diversity and public health by introducing organic farming and expanding the integrated pest management systems.

IX- Follow up on Strategy Implementation and Evaluation

The follow up on the implementation of the NSAD and the evaluation of achievements are management functions intended to ensure the sound implementation of the strategy programs, projects and measures. The follow up will include systematic assessment of implementation stages and evaluation of achievements, with the aim of removing obstacles and introducing changes to plans and programs on the basis of encountered problems and constraints. The success in implementing the programs, projects and measures of the NSAD depends, to a great extent, on the follow up and evaluation system, which requires the designation of an entity to carry out these functions and setting a mechanism for its work.

It is recommended that the Economic Consultative Council designate such entity, which will bear the responsibility for follow up and evaluation of the performance of the public and PS institutions responsible for implementing the NSAD and the mechanism for carrying out its responsibilities.

Appendix

List of Priority Project

The programs, projects enabling environment and support measures proposed by the strategy form one package, and should be implemented in an integrated manner. The strategy objectives will not be fully achieved if the strategy projects and measures are implemented on a selective basis.

Considering that it might not be possible to start implementing the projects as one package, a list of priority projects for implementation was prepared based on socio-economic and environmental considerations, the complementary nature of these projects and the availability of financial resources to the implementing agencies. The list of priority projects is as follows:

1- Rain-fed agriculture.

- Establishment of natural reserves.
- Soil and water conservation measures.
- Treated wastewater use as a source for supplementary irrigation.
- Multiplication of improved field crops seeds.
- Introduction of medicinal and herbal plants in small-holdings.
- Implementation of forest development programs.

2. Livestock and natural rangeland.

- Rangeland development program.
- Management of government rangeland.
- Utilization of agricultural by-products for the production of animal feed.
- Cultivation of spineless cactus for feed.
- The use of treated wastewater for the production of fodder crops.
- Survey of major epidemic diseases of livestock and establishing a computerized database for these diseases.
- Improvement of sheep and goat productivity.
- Improvement of production efficiency in the poultry sector.

3- Irrigated agriculture in the JV .

- Improving irrigation water-use efficiency.
- Privatization of the management of irrigation water distribution system.
- Desalination of brackish water.
- Reducing the salinity of Al-Samraw wastewater effluent
- Establishment of a database for irrigation water.
- Enhancement of integrated pest management programs.
- Monitoring of soil pollution in JV.

4- Irrigated agriculture in the Highland

- Safe use of pesticides.
- Development of fruit tree seedlings production.

- Using treated wastewater in the production of fodder, industrial and oil crops.
- Development of the cut flowers and herbal plants sector.
- Rehabilitation of springs and irrigation canals.

5- Marketing of produce

- Establishment of a national company for the marketing horticultural products.
- Development of horticultural exports to markets of high quality requirements.
- Improvement of the marketing infrastructure of the horticulture export sector.
- Improvement of the wholesale markets for fruit and vegetables in Amman, Irbid and Zarka.
- Improvement of live animal wholesale markets.

6- General Project:

- Establishment of an Agricultural Development Fund.
- Soil survey and classification for rainfed, irrigated and rangelands.
- Improvement of production of olives and marketing of olive oil in irrigated and rainfed areas.

8- Sources of Statistical Data

The source of all statistical data used in the strategy, except those on water, is the Department of Statistics and the annual reports of the Central Bank of Jordan, which also rely on the Department of Statistics figures. Those on water were extracted from a report prepared by the MoWI on available and potential water for irrigation, 2001.

The drafting committee, however, did review some data and amended them following discussions with the Department of Statistics, the Ministry of Water and Irrigation and the Customs Department.

List of Abbreviations

- AC : Agricultural Committee
- ACC : Agriculture Credit Corporation
- AD : Agricultural Development
- AMO : Agricultural Marketing Organization
- AMPCO : Agricultural Marketing and Processing Company
- AS : Agricultural Sector
- ASAL : Agricultural Structural Adjustment Loan

- ASTAP : Agricultural Structural Adjustment Program
- DLS : Department of Land and Survey
- DoS : Department of Statistics
- Du : Dunum (1000 m2)
- EU : European Union
- Ext. D : Extension Department, MoA
- GATT : General Agreement on Tarrifs and Trade
- GDP : Gross Domestic Product
- GUJF : General Union of Jordanian Farmers
- IPM : Integrated Pest Management
- JD : Jordanian Dinar
- JISM : Jordan institute for standards and metrology
- JUST : Jordan University for Science and Technology
- JV : Jordan Valley
- JVA : Jordan Valley Authority
- MCM : Million Cubic Meter
- MoA : Ministry of Agriculture
- MoEN : Ministry of Environment
- MoFA : Ministry of Foreign Affairs
- MoH : Ministry of Health
- MoIT : Ministry of Industry and Trade
- MoMRA : Ministry of Municipality and Rural Affairs
- MoP : Ministry of Planning
- MoPW : Ministry of Public Work
- MoWI : Ministry of Water and Irrigation
- NCARTT : National Center for Agricultural Research and Technology Transfer
- NGO : Non-governmental Organizations
- NIC : National Information Center
- NSAD : National Strategy for Agricultural Development
- PS : Private Sector
- PU : Public University
- RGC : Royal Geographic Center
- RSCN : Royal Society for Conservation of Nature

- WTO : World Trade Organization

VII- Enabling Environment and Support Services

The success of the National Agricultural Development Strategy in achieving its objectives depends, to a great extent, on the Government's ability to provide an enabling environment and required support services for its implementation. This will depend mainly on improving the efficiency of the responsible government institutions and in providing the required services to help the PS in assuming its role in development.

The following measures are recommended:

7-1 Developing the role of the Ministry of Agriculture in agricultural development

- Enact a new law for agriculture that focuses on the following:
 - Defining the Government role in the development of the agricultural sector, and the responsibilities and functions of the MoA. The law should be considered as a law for agriculture not a law for MoA.
 - Giving the MoA a direct development role in addition to the functions of organizing, directing and supervising the AS.
 - Assigning MoA the responsibility of preparing agricultural policies and presenting them to the Agricultural Council for consideration, prior to submitting them to the cabinet for approval.
 - Subjecting decisions made by "Higher Planning Council" regarding the use of agricultural land, inside and outside the boundaries of the municipal and village boundaries to non-agricultural use to a prior approval of MoA.
 - Giving the MoA the authority to license the PS organizations operating in the AS, other than cooperative societies.
 - Assigning MoA the responsibility for on-farm water management and its participation in the planning of irrigation projects.
 - Participation of MoA in the preparation of specifications and conditions for the use of marginal and treated wastewater in agriculture.
- Revising the Ministry's organizational structure to:

- Reorganize the administrative units in light of the new responsibilities that will be assigned to the Ministry by the anticipated new Agricultural Law.
- Assign specific and clear responsibilities and functions for the administrative units to enable them to deal with the rapid changes in the AS, and to implement the NSAD.

7-2 Strengthening Cooperation and Coordination Among Agencies Concerned with Agricultural Development

- Assign the position of the chair of the Agricultural Council to the Prime Minister.
- Define the Agricultural Council duties more clearly, and give it the authority to carry out these duties.
- Provide the Agriculture Council with the operating mechanism it lacks, through incorporating an article in the council by-law, regarding the establishment of an administrative unit and permanent committees to serve the council, defining their responsibilities, and functions.

7-3 Rural Financing and Agricultural Credit

Agricultural financing is currently limited to what the Government provides through the Agricultural Credit Corporation (ACC). The institution was established by virtue of Temporary Law Number (50) for the year 1959, through the merging of three credit institutions: the Agricultural Credit Bureau, the Cooperative Development Department and the Agricultural Bank into one corporation, the "Agricultural Credit Corporation." Since 1989, the ACC has become the only official source for providing agricultural loans to farmers, when the Cooperative Bank and the Jordan Valley Farmers Association ceased to provide loans due to their unsuccessful lending experience.

The ACC paid-up capital is JD 24 million, and its reserve capital is JD 12.5 million. External financing resources, include loans and credit facilities from local sources of about JD 46 million, while external loans is about JD 28 million. By the end of 2000, farmers' outstanding loans reached about JD 105 million for 65,000 creditors, out of a total of JD 300 million that the Corporation lent since its establishment

During the last few years, the ACC started to face real challenges that would affect its sustainability, unless dealt with on sound basis. Some of the most prominent challenges are:

- The government's decision, over the last decade, to waive interest on loans (totaling around JD 27 million over the last decade) and to reschedule loans regardless of the negative impact of these actions on debtors' commitment to pay, the Corporation's relations with international financing organizations, and the Corporation's future as the only source of agricultural credit.
- Limiting the ACC role to the provision of agricultural loans, which are generally characterized as high-risk loans, especially under the agricultural conditions in Jordan. The ACC has not yet financed non-agricultural rural developmental activities and has not been involved in other financial services and activities that could secure rewarding returns for the Corporation.
- Insufficient staff specialized in banking and financial services, especially at the senior administrative levels.
- In order for the Corporation to overcome problems and obstacles it faces, and to continue providing the needed financing for the agricultural and rural development projects (now and in the future), it is suggested to convert the ACC into an independent "Bank for Rural Development", under the supervision of the Central Bank of Jordan, by the end of the year 2004. To achieve this, it is suggested that the government take the following measures:

- i. Invite the PS to participate in the Corporation's capital, through the sale of part of its paid-up capital of JD 24 million to the PS, or through increasing the Corporation's Capital to JD 40 million. To encourage the PS to take shares in the bank's capital, the government should consider providing attractive incentives, including selling the PS special stocks, with a government's guarantee of a minimum level of returns during the first years of operation.
- ii. Support the financial position of the Corporation through its assuming other financial services needed by rural population, such as opening current and savings accounts; issuing and clearing checks, money transfers and currency exchange, which are expected to secure high financial returns that would improve the Corporation's financial position.
- iii. Update credit rules and regulations, decrease the cost of transactions and consider profit making, attract savings and consider the rate of loan repayment as the criteria to evaluate the Corporation's achievements and its branches, rather than the size of loans issued.
- iv. Support the ACC staff with banking expertise, and train agricultural engineers working at the Corporation to perform the technical work and loans supervision.

7-4 Information and National Agricultural Statistics

Accurate and reliable agricultural information and statistics is the cornerstone of proper agricultural development planning and policy-making. Furthermore, providing accurate information to parties working in the agricultural sector (public and private, individuals and establishments) is critical to helping them make decisions on an informed, scientific basis. Information and agricultural statistics still fall short of meeting the required level for several reasons, including:

- The existence of multiple agencies that collect and disseminate agricultural data and statistics, often resulting in contradicting and unreliable information, thus confusing users, and limiting the opportunities of proper planning for agricultural development.
- A shortage of the agricultural and marketing data required to follow-up development in the agricultural sector, to enable individuals, organizations and institutions working in agriculture and agribusiness to take proper decisions based on timely, and reliable information. Agricultural statistics and data, at the level of agro-ecological zones, which generally form the base for agricultural development planning, are not available, except for the JV area.
- Lack of cooperation and co-ordination among organizations concerned with the collection and provision of agricultural statistics and data, whether at the level of preparation of programs or field-work, and between these organizations and the users of the information in the public and private sectors.

In order to provide accurate and reliable agricultural statistics and information, it is suggested to establish a permanent "Committee of Experts" for agricultural statistics composed of representatives from the General Department of Statistics, the MoA, MoWI, MMRA, the Lands and Survey Department, and three experts representing the users of agricultural statistics, from the private and public sectors. This committee should be responsible for defining data and information needed to formulate AD policies and strategies, preparing the scope of work for collecting information, including designing the sample, the survey questionnaires, the agencies responsible for (or participating in) collecting information, and reviewing statistical information before its adoption and release. The Committee should take the following issues into consideration:

- Expanding the database to include all information needed to follow up developments in the AS, and to enable the Government to introduce changes to agricultural policies and programs based on reliable and accurate information.

- Revisiting the methodology used for collecting information, to ensure that such information would reflect, through its comprehensiveness, accuracy and details, the economic, social, and environmental significance of resources, crops, and agribusiness, on which information is collected, and would meet user needs in the public and PS.
- Preparation of agricultural data and information at the level of agro-ecological zones such as the rainfall distribution in rain-fed areas, soil type, quality of irrigation water, and climatic parameters in irrigated areas, in addition to providing it on at administrative levels.
- Reviewing and standardizing the terms and definitions used in preparing agricultural information and statistics for all government institutions.
- Mandate General Department of Statistics, to prepare and implement a training program for statistical staff at ministries and departments responsible for the collection of agricultural information.
- Requiring each agency responsible for data collecting to collect it in accordance with the methodology prepared by the "Committee of Experts", using the forms prepared for this purpose.
- Designating the General Department of Statistics as the sole source of providing national agricultural statistics to avoid duplication and/or contradiction.
- The Director General of the Department of Statistics and the Secretary General of the Ministry of Agriculture should be the reference to the "Committee of Experts" for agricultural statistics.
- Incorporating an article in the draft law for agriculture for the year 2002, regarding the right of the MoA to collect agricultural information for research and study purposes needed for preparing special reports that are not in contradiction with DOS data.

7-5 Agricultural Research, Technology Transfer and Extension Services

The contribution of agricultural research output to agricultural development was below the expected level despite the establishment of a special department at the MoA for agricultural research and extension in the 1950s, and colleges of agriculture at three government universities, and carrying out numerous studies and research activities by many organizations.

Fragmented national efforts and poor coordination among research institutions has resulted in overlap and duplication of some research activities. Weak interest in research and agricultural extension is reflected in the limited financial and human resources allocated for the development of the institutional and technical capacities of research and extension services. Among the main problems and constraints that have faced the efforts to develop agricultural research and extension in Jordan over the last fifty years are:

- Insufficient numbers of highly qualified researchers with varying expertise at the National Center for Agricultural Research and Technology Transfer (NCARTT). This shortage has limited the ability of the center to contribute to achieving the objectives of the agricultural development strategies.
- Inability of NCARTT to retain holders of high academic degrees due to low salary scale and remuneration package.
- Shortage of qualified intermediate technical human resources in nearly all institutions, and specifically at universities.
- Shortage of financial resources allocated by different organizations, which weakens their ability to implement programs requiring long-term research, or to upgrade their laboratories to meet scientific requirements and

developments in research.

- Absence of a body to coordinate research and agricultural extension efforts at the national level has resulted in the fragmentation of research and extension efforts.
- Research outputs of some research institutions is not linked to AD plans, which reduces their contribution to solving the problems facing the AS.

As future agricultural development in Jordan will depend mainly on the contribution of agricultural research and extension in increasing productivity, reducing production costs, and improving the quality of produce, and in view of the limited availability of resources, it is recommended to re-examine the structure of the national agricultural research system, the agricultural extension service, and means of technology transfer to achieve the objectives of the NSAD based the following recommendations:

1- Establishing a "National Commission for Agricultural Research and Extension" composed of government and non-government organizations, mandated to carry out research activities, technology transfer and agricultural extension. The Commission should be composed of representatives of: the General Corporation for Agricultural Research and Extension (to be established), Colleges of Agriculture, the General Corporation for the Protection of the Environment (or the Ministry of the Environment when established), the Royal Scientific Society, the Higher Council for Science and Technology, the Jordan Valley Authority/Ministry of Water and Irrigation, and any research center established in the future.

The commission should assume the following mandate:

- Operate as a focal body to coordinate national efforts in the areas of agricultural research, technology transfer, and agricultural extension services.
- Develop a national strategy for agricultural research and extension that contributes to the achievement of agricultural development objectives, and follow-up its implementation. Use the national strategy for research and agricultural extension as the basis for financing research and extension activities to be implemented by institutions participating in the Commission.
- Support the national efforts to develop the academic and technical abilities of the staff of member institutions in the Commission, to enable them to efficiently deal with changes and developments affecting the development and growth of the AS on the local and international levels.
- Provide necessary financial resources to develop infrastructure for all institutions members in the Commission to cope with research requirements, and promote teamwork based on multidisciplinary approach.

2- Develop the NCARTT, including its laboratories and agricultural research stations, into a new organization to be called "the General Corporation for Agricultural Research and Extension."

- The Corporation is to be managed by a governing council representing members of the National Commission for Agricultural Research and Extension (to be established), the Jordanian General Farmers Association, deans of scientific research colleges at public universities, researchers with distinguished expertise, and producers representing the different agricultural production sectors.
- The Corporation shall operate according to a special law granting it financial and administrative autonomy.
- The Corporation, in accordance to its law, will assume the following duties:
 - Conduct applied research, publish and transfer research outputs to target farmer groups, assist in their adoption, and follow-up on their implementation.
 - Conduct economic and social studies related to the development of AS.

- Finance and follow up the implementation of research, technology transfer, and agricultural extension projects and activities included in the National Strategy for Agricultural Research and Extension, adopted by the National Commission for Agricultural Research and Extension.
- Organize extension and training programs for farmers, and train research and extension staff on advanced methods of research, technology transfer, and agricultural extension, through scholarships and training courses at national and foreign universities.
- Provide laboratory and analyses and testing services that cannot be undertaken by the PS.
- Conduct research and studies related to the development of production systems that improve the economic use of agricultural resources while sustaining their productive capacity and protecting the environment.
- Issue financial and administrative by-laws, guided by University by-laws, defining the bases for appointing the General Director of the Corporation, his/her qualifications, and the bases for appointing and promoting researchers and defining their scientific ranks.
- Issue by-laws to define the following:
 - Basics for preparing, approving, and implementing corporation activities. The national strategy for agricultural research and extension is to be considered as the reference for all of the corporation's research and extension activities.
 - Designate the Corporation as the focal point for all agricultural research and extension activities at the national level.
 - Define methods of participation of local research and agricultural extension institutions (and their researchers) in conducting research and agricultural extension activities, and in using the facilities available through institution members of the National Commission for Agriculture Research and Extension.

7-6 Measures to be Taken by Government Institutions other than the MoA in Support of the NSAD

It is recommended that the following government institutions take needed measures to facilitate the implementation of the NSAD, each within the scope of its responsibilities and mandate.

i. The Ministry of Water and Irrigation

- The Ministry is to continue assuming the responsibilities of water-resource use and planning, water-resource development, protection of national water rights, protection of watershed areas, executing irrigation projects, and ensuring the sustainability of supplying irrigation water for these projects.
- The Jordan Valley Authority is to continue to develop and protect water resources in the Valley, construct and maintain irrigation projects and irrigation water distribution systems up to the farm-gate, either through its staff, or through management contracts with the PS.
- Cooperate with MoA for the agricultural development of watershed areas.
- The MoA should, as soon as possible, assume the responsibility of on-farm water management in JV and the Highlands.
- Confirm the joint responsibility of the MoA and the MoWI in the planning of irrigation projects in all areas of the Kingdom, including wastewater treatment and marginal water projects and defining their uses in agriculture.

- Confirm the joint responsibility of the MoA and MoWI in determining water requirements of agricultural crops, and in determining the annual water budget accordingly.

ii. The Ministry of Municipal, Rural Affairs, and the Environment

- Prepare plans for land use after completing land surveys and soil classification, and preparation of an appropriate land-use law.
- Adopt regional planning as a basis for determining land use for urban expansions, the establishment of new villages avoiding encroachment on prime agricultural land, and ensuring protection of the environment.
- Halt the expansion of municipal and village boundaries till the adoption of a land-use law, adopt accurate criteria for land classification within rural and municipal boundaries, and define the directions of future expansion of these boundaries.
- Amend the Law for Cities, Villages, and Building Planning in the year 1969, to include MoA as a member of the Higher Planning Council, and the Planning Committees at different levels.
- Strict application of legislation regarding building on agricultural land and on the non-provision of public services to such buildings to prevent their expansion and their development into villages causing negative impact on agriculture and the environment.
- Amend the Law of Municipalities to allow the PS (companies and NGOs) to own and manage wholesale markets within municipal boundaries, as is the case outside these boundaries.
- Amend the Law of Municipalities to entrust the MoA with the technical aspects of wholesale markets operations, and to enforce quality requirements and packaging of products, in Amman and other municipalities' wholesale markets, whereas municipalities would be responsible for administrative and financial management of the markets.
- Amend the by-laws of the wholesale markets for fruit and vegetables to allocate part of market revenues to the agricultural development fund to be established as stipulated in the law of the agriculture.

iii. The General Corporation for the Protection of the Environment

- Amend the Corporation's Law to allow it to effectively participate in decisions made regarding the approval of development programs and projects in all sectors of the economy, in order to ensure their compliance with the environmental safety requirements.
- Study the possibility of granting full autonomy to the Corporation with direct linkage to the Prime Minister's office or establishing a Council for the Environment, considering the existence of several agencies concerned with the issues for which the corporation is mandated.

iv. The Ministry of Trade and Industry

- Designate the Ministry of Trade and Industry as the focal agency for dealing with issues related to WTO agreement and other regional agreements. The Ministry has already established a Directorate for trade policies, a Directorate for the protection of national products, and enacted the "Law of National Production Protection" as well as related by-laws. It is proposed that the Ministry assumes the following responsibilities:

- Exploit windows of opportunities provided by WTO, regional and international agreements through establishing programs to support and provide incentives to farmers in areas of environmental and social concerns, such as improving the quality of irrigation water, the protection and conservation of natural resources, social and economic development of rural areas, fighting rural poverty, and protecting the environment.
- Study international agreements to define windows of opportunities that allow agricultural subsidies, areas for possible support and the means to benefit from them to reinforce the role of the AS in providing food and enhancing social security.
- Expand export opportunities, reduce the challenges of imports, ensure compliance with SPS regulations and avoid of fraudulent practices and unfair competition practices through expediting the following measures:
 - Establish a “Permanent National Committee” from the relevant public and PS organizations, headed by the Ministry of Industry and Trade, to prepare a national plan for limiting losses and increasing gains from joining the WTO. Sectoral committees should be established under the national committee, including a special committee for Agriculture to be headed by MoA.
 - Establish a “committee of experts” to follow up on the 1994 GATT agreement and the agreement on agriculture, to include representatives from the MIT, MoA, and PS institutions. The committee should be responsible for studying both agreements, exploring privileges and exemptions from which Jordan can benefit as a developing and net food importer country. The committee should undertake all necessary actions to maximize benefits from these agreements, and study the need for enacting new legislations concerning Jordan's relations with the WTO or amending current legislations.
 - Cooperate with MoA to study the impact of joining the WTO on the AS and the expected challenges, and prepare scenarios for how to deal with them. Submit results to the Permanent National Committee and the Committee of Experts so that work can begin.
 - Establish a Permanent National Committee for WTO negotiations on agriculture, to include representatives from MIT, the MoA, Jordan Export Development Corporation, JISM, and the PS. The committee should be responsible for all negotiations, and should submit its reports to the agencies it represents and to the Permanent National Committee and the Committee of Experts.

v. The Ministry of Planning

- Secure the needed support for AD programs and projects, including external technical assistance by donor governments and agencies and international organizations.

vi. The Ministry of Labor

- Review the law of labor to cover permanent agricultural workers by the social security program, to ensure that they receive the same privileges as those in other sectors of the economy.

vii. The Universities

- Review academic programs and training activities at faculties of agriculture to meet the requirements of AD, and qualify graduates for practical application of knowledge.

viii. The Jordan Institute for Standards and Metrology (JISM)

The JISM law has been amended to extend its responsibilities to meet the requirements of trade liberalization and WTO agreements, to be the accredited national agency to approve the technical standards, implement claim measures, and issue quality certificates for export products. Furthermore, its organizational structure was upgraded to include administrative units required to carry out the institute's responsibilities. It is essential for JISM to:

- Complete the standard specifications for the remaining agricultural products and for treated wastewater use for irrigation purposes.
- Establish a suitable mechanism to apply these standards.
- Develop the institute's laboratories, and train its staff.
- Become member of relevant international organizations
- Establish points of information and reporting regarding its activities.

ix. The Ministry of Finance/Land and Survey Department

- Review the by-laws allowing the partition of agricultural land among partners into parcels of 4 du.

x. The Ministry of Finance/Customs Department

- Develop its institutional capabilities to implement the WTO agreement regarding Actual Valuation of Customs (AVC).
- Coordinate with the Department of Statistics to ensure the accuracy of data regarding exports and imports of agricultural commodities in terms of quantity and value.
- Follow-up development on the ASYCUDA systems to simplify procedures and control of foreign trade statistics.

7-7 Development of Private Sector Institutions and Organizations in Support of NSAD

- Establish farmer commodity associations for the production and marketing of the following products: olives, citrus fruit, apples, stone- fruits, vegetables in the JV and the High lands, cereals and grains legumes, ornamental plants and cut flowers, sheep and goats, broiler chickens, table eggs, grapes, date palm, and dairy cows.
- Amend the current Law of the General Farmers Union to be composed of a general assembly, comprising all members of the Boards of Directors of the Farmers Commodity Associations, and an Executive Board of Directors composed of Chairmen of the farmer commodity associations.

- Prepare the required legislation to establish and organize the work of the farmer commodity associations, and the General Farmers Union, and provide the needed technical and financial support to these organizations within the provisions allowed by WTO agreement.
- Establish a Jordanian Chamber of Agriculture.

Matrix of Main Measures to Provide Enabling Environment and Support Services Needed for The Implementation of the Strategy

No.
Measure
Executing Agency

1.
Enact a new agricultural law that gives the Ministry of Agriculture a greater development role.
Ministry of Agriculture
 2.
Review the organizational structure of the MoA in light of the new law.
Ministry of Agriculture
 3.
Restructure and reactivate the Agricultural Council.
Council of Ministers
 4.
Transform the ACC into a Rural Development Bank.
Council of Ministers
 5.
Establish a Permanent Committee of Experts to develop and improve agricultural information and statistics.
Ministry of planning
- DOS
6.
Restructure agricultural research and extension services.
Ministry of Agriculture

Council of Ministers
 7.
Enhance coordination and cooperation between MoWI and MoA in the field of water use in irrigation.
Ministry of Water and Irrigation,

Ministry of Agriculture.
 8.
Review the Jordan Valley Authority by-laws to enable it to carry out responsibilities stipulated in the new Jordan Valley development law.
Jordan Valley Authority
 9.
Define land use for various purposes and enact a new law for land use.
Ministry of Municipal. Rural Affairs and the Environment
 10.
Ensure compliance of the relevant organizations to the laws and regulations related to the building on agricultural land.

Ministry of Municipal, Rural Affairs and the Environment.

11.

Amend the by-laws of fruit and vegetable wholesale markets allowing the private sector to own and manage wholesale markets within the municipal boundaries, and give the Ministry of Agriculture a role in the management of these markets.

Ministry of Municipal, Rural Affairs and the Environment.

12.

Give the general cooperation for the protection of the environment more power in protecting national resources and the environment.

Ministry of Municipal, Rural Affairs and the Environment

13.

Protect local market, expand export opportunities and reduce challenges of imports to local production.

Ministry of Agriculture

Council of Ministers

14.

Allocate a greater part of the assistance offered by donor countries for providing technical assistance and expertise for the agricultural sector.

Ministry of Agriculture

Ministry of Planning

15.

Review the labor law.

Council of Ministers

16.

Develop the educational and practical training programs at the faculties of agriculture.

Universities

17.

Enhance the potentials of the JISM to become an effective national institute in approving technical regulations, ensuring compliance with issuing certificates of quality and accrediting laboratories.

Ministry of Trade and Industry.

Institute for Standards and Metrology

18.

Review by-laws allowing the partition of agricultural land into parcels of 4 du.

Department of Lands and Survey

Council of Ministers

19.

Improve export and import data, and the application of the Actual Evaluation of Customs Agreement and ASYCUDA.

Custom Department

20.

Establish commodity farmers associations.

Ministry of Agriculture

Council of Ministers

21.

Reestablish the Farmers General Union on the basis of Commodity Farmers Associations.

Ministry of Agriculture

Council of Ministers

22.

Establish a Chamber of Agriculture.

Ministry of Agriculture

Council of Ministers

VIII- Expected Economic, Social and Environmental Returns

8-1 Economic Returns

The direct economic returns from the implementation of the National Strategy have been estimated for the main production sectors that showed large potentials for increasing efficiency, productivity and quality of produce. These included vegetables, fruit, olives, cut flowers, cereals, forage and small ruminants sectors.

Estimates are made on the assumption that 50 percent of farmers will increase their productivity to the level already achieved by leading local farmers during the first five years of the implementation of the strategy, increasing to 70 percent of farmers by 2010.

i. Fruit Production

- Fruit Production in the Irrigated Highlands (Stone Fruit, Apples and Grapes)

- An increase in fruit production from about 50 thousand tons at present to 140 thousand tons by 2010, which would result from an expansion in the area planted with fruit trees from 38 thousand du to 70 thousand du in replacement of areas cultivated with vegetables and olives in unsuitable environments, and from an increase in average productivity from 1.3 tons/du to 2 tons/du.

- An increase in the economic life of fruit trees from (12-15) years to (17-20) years.

- An improvement in the quality of produce and an increase in the percentage of first grade products from 30 percent to 70 percent.

* Fruit Production in the Jordan Valley

- Citrus

- An increase in the production of citrus fruits from about 162 thousand tons (at present) to about 216 thousand tons in 2010, as a result of increasing productivity from 2.7 tons/du to 4 tons/du.

- Early Grapes

- An increase in the cultivated area of grapes in JV from 2.5 thousand du to 20 thousand du as part of the national effort to expand the high-value crop cultivation in replacement of low-return surplus crops, and the expected increase in exports, based on the existence of an important marketing niches in European markets from mid-May to mid-June.

- Date Palm

An increase in the cultivated area of date palm in JV from 4 thousand du (at present) to 20 thousand du, as part of the efforts to introduce high-value crops that also require less water and soil quality in the JV.

ii. Vegetables Production

- Vegetables Production in the Highlands

- An increase in the area of protected agriculture from 5 thousand du (at present) to about 20 thousand du by 2010, which will increase productivity in these converted areas by about 400 percent, and improve quality of products.

- Vegetables Production in the Jordan Valley

- An increase in the area of protected agriculture, under plastic houses, from 9 thousand du to 35 thousand du by 2010, and from 6 thousand du to 15 thousand du under plastic tunnels, which will increase productivity in these converted areas by about 400 percent and improve quality of products.

iii. Exports of Horticultural Produce

- Fruit and Vegetables

- An increase in the annual exports of fresh fruit and vegetables to the traditional Gulf and neighboring markets from 382 thousand tons to 630 thousand tons by 2010, to East-European markets from 8.4 thousand tons to 60

thousand tons, to West European markets from 2.2 thousand tons to 30 thousand tons, and to other markets from 4 thousand tons to 30 thousand tons.

- An increase in the total value of annual exports from JD 72 million to JD 215 million by 2010 at 2000 prices.

- Olive and Olive Oil

- A 50 percent increase in olive productivity, an improvement in the quality of products, reducing the production cost by implementing the proper agricultural practices, and limiting cultivation of olives to the suitable agro ecological environments, will improve competitiveness in export markets and increase exports to 10 thousand tons by 2010, at an estimated value of about JD 5.6 million.

- An improvement in the processing and marketing of olive oil. Export of olive oil is expected to increase from 300 tons(at present) to 2250 tons by 2010, at a value of about JD 3.5 million.

- Cut Flowers

- An increase in cut flowers production from 50 million flower to 100 million flower by 2010, and an increase in the annual exports from 1.5 million flower to 30 million flower, at a total value of about JD 7.5 million.

iv. Field Crops

- An increase in the productivity of 740 thousand du of field crop area to reach 200 Kg/du for wheat, 150 Kg/du for barley, 100 Kg/du for lentils, and 120 Kg/du for chickpeas, as a result of introducing and adopting new production technologies.

- Average total production of field crops is expected to reach 119 thousand tons, of a total value of about JD 16 million.

- It is also expected to gradually stop cultivating cereals in about 590 thousand du of marginal areas not suitable for the cultivation of field crops and their use for fodder production or as rangeland. Value of feed production in this area is estimated at JD 6 million annually.

v. Animal Feed Production

The implementation of strategies, programs and projects aimed at rangeland rehabilitating, developing new rangelands, and introducing improved rangeland management systems will result in:

- A 10-15 percent increase in rangeland productivity.

- An estimated production of about 20 thousand tons of green forage from cultivating 100 thousand du with spineless cactus in areas with low rainfall.

- Use of agricultural by-products (straw, olive cake, banana leaves, tomato waste, and poultry mats etc.) to produce 200 thousand tons of feed mixes for a total value of about JD 12 million.
- Production of about 70 thousand tons of green forage using wastewater, at a total annual value of JD 1 million.

vi. Small Ruminants

- A substantial increase in the productivity of sheep and goats as a result of increasing fertility, the number of twins, and the average weight of slaughtered animals. This will be achieved through improved animal health care, herd management and genetic improvement.
- The net returns of small ruminants (1.6 million sheep and 600 thousand goats) is expected to increase from about JD 9 per head of sheep to JD 22, and from about JD 22 per head of goats to JD 40, and a total increase in the value of annual production in this sector from JD 28 million at present to JD 59 million in 2010.

8-2 Social Returns

- Income of farmers and livestock breeders is expected to increase as a result of improved agriculture productivity, the introduction of high-value crops in the cropping pattern and of improved quality of products.
- Migration from rural to urban areas will greatly decline as a result of increased job opportunities that would be created by a modern agriculture sector, by agribusiness activities and services and by training rural population, especially the young men and rural women to carry out income generating projects.
- Gradual reduction of expatriate labor in the AS.
- An increased participation of farmers and rural communities in the planning and implementation of rural development projects through their own organizations. This will be positively reflected on the speed and efficiency of implementation of rural development programs, and on farmer support of government policies and interventions.

8-3 Environmental Returns

- Halting unplanned expansion of urban areas on agricultural land, and of violation of current legislation prohibiting building on agricultural land, through denial of services to these buildings.
- Combating desertification and protecting, the environment, the agro-biodiversity and agricultural resources, to secure requirements for sustained development. This will be attained through protection and development of forests and of natural rangeland, especially rangeland with high productive potential (about 10 million du) through the establishment of rangeland areas cooperative societies under the supervision of MoA, the protection of remaining rangeland through organizing grazing, the establishment of additional range reserves and overcoming problems with local communities regarding the use of rangeland resources.
- Conservation of agricultural land through the control of soil erosion in mountainous areas with high slopes, through improved agricultural practices and water harvesting structure.
- Mitigating the environmental risks of treated wastewater through its use in agriculture, which is expected to reach 177 million cubic meters by 2010.

- Protection of the rural agricultural environment, creating a cleaner and more beautiful rural area, which will promote eco-tourism.
- Ensure environmental safety, protection of bio-diversity and public health by introducing organic farming and expanding the integrated pest management systems.

The follow up on the implementation of the NSAD and the evaluation of achievements are management functions intended to ensure the sound implementation of the strategy programs, projects and measures. The follow up will include systematic assessment of implementation stages and evaluation of achievements, with the aim of removing obstacles and introducing changes to plans and programs on the basis of encountered problems and constraints. The success in implementing the programs, projects and measures of the NSAD depends, to a great extent, on the follow up and evaluation system, which requires the designation of an entity to carry out these functions and setting a mechanism for its work.

It is recommended that the Economic Consultative Council designate such entity, which will bear the responsibility for follow up and evaluation of the performance of the public and PS institutions responsible for implementing the NSAD and the mechanism for carrying out its responsibilities.

Appendix

List of Priority Project

The programs, projects enabling environment and support measures proposed by the strategy form one package, and should be implemented in an integrated manner. The strategy objectives will not be fully achieved if the strategy projects and measures are implemented on a selective basis.

Considering that it might not be possible to start implementing the projects as one package, a list of priority projects for implementation was prepared based on socio-economic and environmental considerations, the complementary nature of these projects and the availability of financial resources to the implementing agencies. The list of priority projects is as follows:

1- Rain - fed agriculture.

- Establishment of natural reserves.
- Soil and water conservation measures.
- Treated wastewater use as a source for supplementary irrigation.
- Multiplication of improved field crops seeds.
- Introduction of medicinal and herbal plants in small-holdings.
- Implementation of forest development programs.

2. Livestock and natural rangeland.

- Rangeland development program.
- Management of government rangeland.
- Utilization of agricultural by-products for the production of animal feed.
- Cultivation of spineless cactus for feed.
- The use of treated wastewater for the production of fodder crops.

- Survey of major epidemic diseases of livestock and establishing a computerized database for these diseases.
- Improvement of sheep and goat productivity.
- Improvement of production efficiency in the poultry sector.

3- Irrigated agriculture in the JV .

- Improving irrigation water-use efficiency.
- Privatization of the management of irrigation water distribution system.
- Desalination of brackish water.
- Reducing the salinity of Al-Samra wastewater effluent
- Establishment of a database for irrigation water.
- Enhancement of integrated pest management programs.
- Monitoring of soil pollution in JV.

4- Irrigated agriculture in the High land

- Safe use of pesticides.
- Development of fruit tree seedlings production.
- Using treated wastewater in the production of fodder, industrial and oil crops.
- Development of the cut flowers and herbal plants sector.
- Rehabilitation of springs and irrigation canals.

5- Marketing of produce

- Establishment of a national company for the marketing horticultural products.
- Development of horticultural exports to markets of high quality requirements.
- Improvement of the marketing infrastructure of the horticulture export sector.
- Improvement of the wholesale markets for fruit and vegetables in Amman, Irbid and Zarka.
- Improvement of live animal wholesale markets.

6- General Project:

- Establishment of an Agricultural Development Fund.
- Soil survey and classification for rainfed, irrigated and rangelands.
- Improvement of production of olives and marketing of olive oil in irrigated and rainfed areas.

8- Sources of Statistical Data

The source of all statistical data used in the strategy, except those on water, is the Department of Statistics and the annual reports of the Central Bank of Jordan, which also rely on the Department of Statistics figures. Those on water were extracted from a report prepared by the MoWI on available and potential water for irrigation, 2001.

The drafting committee, however, did review some data and amended them following discussions with the Department of Statistics, the Ministry of Water and Irrigation and the Customs Department.

List of Abbreviations

-	AC	:	Agricultural Committee
-	ACC	:	Agriculture Credit Corporation
-	AD	:	Agricultural Development
-	AMO	:	Agricultural Marketing Organization
-	AMPCO	:	Agricultural Marketing and Processing Company
-	AS	:	Agricultural Sector
-	ASAL	:	Agricultural Structural Adjustment Loan
-	ASTAP	:	Agricultural Structural Adjustment Program
-	DLS	:	Department of Land and Survey
-	DoS	:	Department of Statistics
-	Du	:	Dunum (1000 m ²)
-	EU	:	European Union
-	Ext. D	:	Extension Department, MoA
-	GATT	:	General Agreement on Tarrifs and Trade
-	GDP	:	Gross Domestic Product
-	GUJF	:	General Union of Jordanian Farmers
-	IPM	:	Integrated Pest Management
-	JD	:	Jordanian Dinar
-	JISM	:	Jordan institute for standards and metrology
-	JUST	:	Jordan University for Science and Technology
-	JV	:	Jordan Valley
-	JVA	:	Jordan Valley Authority
-	MCM	:	Million Cubic Meter
-	MoA	:	Ministry of Agriculture
-	MoEN	:	Ministry of Environment
-	MoFA	:	Ministry of Foreign Affairs

- MoH : Ministry of Health
- MoIT : Ministry of Industry and Trade
- MoMRA : Ministry of Municipality and Rural Affairs
- MoP : Ministry of Planning
- MoPW : Ministry of Public Work
- MoWI : Ministry of Water and Irrigation
- NCARTT : National Center for Agricultural Research and Technology Transfer
- NGO : Non-governmental Organizations
- NIC : National Information Center
- NSAD : National Strategy for Agricultural Development
- PS : Private Sector
- PU : Public University
- RGC : Royal Geographic Center
- RSCN : Royal Society for Conservation of Nature
- WTO : World Trade Organization

Three years

- Conduct research to define suitable environments for the different species of forest tree.

6-2 Livestock and Rangeland Sub-sector

6-2-1 Current Status

i. Animal Production

The livestock sub-sector is one of the main constituents of the agricultural sector, which contributes about 60 percent of the agricultural output and provides a major source of income to 250,000 people. The contribution of the different sectors of livestock to the agricultural produce is variable. While the poultry sector occupies the highest rank, followed by dairy cattle, the small ruminant sector has a special importance due to its social significance, since about 48 percent of the Badia rangeland communities depend on this sector for their livelihood, and that women assume a great role in the production activities through assisting in raising livestock, animal feeding, flock milking

and produce processing. Moreover, it occupies the highest rank concerning the added value, since poultry and dairy cattle sectors depend on imported feed and expatriate labor.

Available statistics indicate that self sufficiency in livestock produce is about 30% for red meat, 53 percent for milk and dairy products, 7.7 percent for fish, and 20-30 percent for honey.

The production of poultry meat and eggs satisfies the consumption need with periodic surpluses as the productive capacity exceeds the local market need.

The value of imported live animals and livestock products was JD 114 million in 1999, out of which JD 73 million was for live and slaughtered animals, frozen meat, fish, and JD 41 million was for milk and dairy products.

In 2000, the livestock sector included about 1,900,000 heads of sheep, 419,000 heads of local goats, 12,000 heads of Shami goats, 4,200 heads of local cows, 61,000 heads of imported dairy cows, 2,074 broilers farms, 272 layers farms, 33,000 beehives and 20 inland fish farms.

The livestock output in 2000 was estimated at 15000 tons of red meat, 143,000 tons of poultry meat, 971 million eggs, 575 tons of fish, and 120 tons of honey.

The livestock in Jordan is exposed to several diseases, most notably external and internal parasites, Foot and Mouth Disease, diarrhea, abortions, Maltese fever, indigestion, and lung inflammations, which lead to high mortality of newborn animals. Some large animals swallow plastic bags, which occasionally result in death. Poultry is also exposed to several epidemic diseases, which result in large losses to breeders. It is noted that some veterinary vaccines in use are not registered.

Available statistics indicate that the average percentage of immunization does not exceed 40 percent of the total number of animals which have to be immunized. This has kept the rate of diseased animals high and resulted in continued low animal productivity and livestock production.

Available data also indicates that the percentage of artificial insemination for cows, does not exceed 20 percent of the number of dairy cows, and that it is not practiced in sheep and goats.

The number of fixed and mobile veterinary clinics in Jordan is 42 and 15 respectively. There are 101 veterinarians at MoA and 345 in the private clinics, veterinary pharmacies, drug stores, and veterinary drugs industries.

There are 14 centers for artificial insemination, 5 veterinary laboratories, one laboratory for livestock feed analysis, and one laboratory for the quality control of veterinary drugs.

There are 16 plants for the production of veterinary drugs, one factory for the production of vaccines, 52 licensed veterinary drugs stores (importing and distributing veterinary materials and vaccines), and 63 veterinary pharmacies.

ii. Livestock Feed Resources

- Natural Rangeland

Natural rangeland in Jordan is an important source for livestock feed. The area of natural rangelands is about 80 million du and constitutes about 90 percent of the total area of Jordan.

Rangelands are defined by Agriculture law No.20 for 1973 as “lands registered as rangelands and any other government land where the average annual rainfall is less than 200 mm that do not have a permanent source of water for irrigation.”

These rangelands are distributed over three agro-ecological regions. These are:

· The Badia Rangelands

Located within areas that receive less than 100 mm of rain per year, and cover about 70 million du. This area is mostly government-owned land.

· The Steppe Rangelands

Located in areas that receive annual rainfall between 100-200 mm and cover about 10 million du. About 90 percent of these lands are privately owned, with an average land ownership of 236 du in the northern regions of the steppe area, 198 du in the middle regions, and 91 du in the southern regions.

The remaining 10 percent of the steppe rangeland is government owned and characterized by rough terrain, which makes it difficult to develop.

· The Highland Rangelands

Located in areas that receive annual rainfall of over 200 mm and cover about 450,000 du. These lands consist of small plots scattered around villages.

The importance of natural rangelands in Jordan is attributed to their production of approximately 360,000 tons of dry matter per year.

The number of people living directly or indirectly on pastoral activities is about 185,000 living in 170 population settlements. Approximately 48 percent of these families own livestock. The Badia and steppe rangelands have the largest water basins in the kingdom and possess high potential for water harvesting in addition to important wildlife biodiversity.

Since the 1950s, the Government has made tangible efforts in the area of rangelands protection, by establishing 28 reserves with a total area of 800,000 du and delegating the responsibility of protecting and using some of these reserves to cooperative societies. However, many of these reserves are limited in area and have faced claims by neighbors of their right to own the land.

The Government also implemented several rangeland development projects, which, however, did not achieve significant impact on rangeland productivity and production till now. These were:

The Rangeland Development for the Production of Red Meat Project, Increasing the Agricultural Production in Arid Zones Project, The Badia Research and Development Program, Integrated Management of Rangelands (Ma'een pioneer project), Sustainable Management of Rangelands project and the National Program for Rehabilitation and Development of Rangelands Project.

Rangelands productivity began to deteriorate in the 1950s when the rangeland protection system (Al-hema) and the traditional grazing rights were cancelled and the declaration of rangelands as open to all. This has led to over-grazing of and did not provide incentives to the livestock owners and the Badia population to protect these rangelands. This deterioration was accompanied by an increase in the number of grazing animals, which exceeded the rangelands carrying capacity and led to the destruction of the plant cover and the decrease of rangeland productive capacity by no less than 60-80 Percent. It also reduced the contribution of these rangelands in meeting the needs of the livestock to about 30 percent only.

iii. Animal Feed

Production of animal feed in Jordan is limited to barley and feed grains, which covers 23 percent of total needs, and to dry forage, which cover 52 percent of requirements.

The value of livestock feed imports, in 1999, was JD 162 million, which included JD 56 million for barley, JD 57 million for corn and JD 49 million for feed concentrates. The total quantity of imported feed products amounted to 1.7 million tons in 2000. Jordan produces 268 thousand tons of all kinds of animals feed which cover about 21 percent of the livestock sector needs.

Jordan still lags behind other countries in using agricultural by-products, which have a potential of providing an estimated 300,000 tons of animal feed.

The most important agricultural by-products include those from field crop harvesting, slaughterhouses, poultry farms, olive presses, tomato factories and others.

6-2-2 Changes that Occurred in the Sub-sector

i. Livestock Production

The changes that occurred in livestock production are expressed in an increase in livestock numbers and in production that took place during the period between the mid 1970s to the end of the 1980s. The number of sheep and goats had doubled as a result of government policy of subsidizing livestock feed, which also led to an increase in the annual export value of live animals to more than JD 50 million. Similarly, there was an increase in the number of imported milk cows and in the production of milk to cover 40 percent of local demand. The number of broiler and layer chicken farms also increased and the production of meat and table eggs has exceeded demand since the end of the 1970s.

Contrary to this trend, during 1990s, the livestock sector experienced a significant decline. Livestock numbers declined, except for imported milk cows which increased by 19 percent, numbers of sheep decreased by 23 percent, local goats by 52 percent, Shami goats by 33 percent, local and hybrid cows by 66 percent, and camels by 45 percent. As a result of these changes, average local production of red meat decreased by 11 percent, and self-sufficiency decreased to 30 percent. However, milk production increased by 30 percent to reach 204 thousand tons, which cover about 53 percent of local consumption of milk and dairy products. The production of poultry meat and table eggs remained in excess of local demand and could not enter export market, with the exception of table eggs, in limited quantities.

The production of fish did not mark any tangible growth. Production did not exceed 1075 tons of fresh fish from sea fishing and inland fish farm, and covered only 15.3 percent of consumption in 2000.

The number of beehives increased to 33 thousand, which produced 110-120 tons of honey covering about 20-25 percent of local consumption.

ii. Livestock Feed Resource

- Rangelands Production

The production of natural rangelands and their contribution in providing livestock feed started to decline in the 1950s when the rangelands were declared as government land with an open access. Among changes observed in this area are the following:

- About 10 million du of rangelands in the Steppe region were transferred to private ownership. These lands possess high potential for development as rangelands.
- Land fragmentation and degradation started to appear in these newly acquired rangelands as they were treated as a trade commodity, rather than as rangelands for feed production. Development became difficult due also to reasons related to the small size of land ownership and social traditions.
- Large areas of rangelands were ploughed, and cleared from surface rocks that protect them from erosion, especially in the eastern areas, for the purpose of claiming land ownership at the time of government land surveys in these areas.

- Due to continuous decrease in land available for rain-fed agriculture and the growing need of livestock feed, about 200,000 du of rangeland in the Steppe areas were ploughed and annually planted with barley.
- Due to modern transportation means available to livestock owners, the movement of heavy equipment in these areas and the use of trucks to transport animals to grazing areas led to overgrazing and to a great and intensified deterioration of the natural vegetation cover and accelerated desertification.
- Increased activities and movements in the Badia areas has also contributed to the disruption of the environmental balance, the acceleration of soil erosion and the destruction of the natural vegetation, which became confined to areas adjacent to the waterways.
- In spite of research efforts that confirmed the availability of opportunities to increase productivity of these lands, the projects implemented by the MoA did not succeed in increasing the rangeland productivity due to lack of involvement of local population in the development. The Ministry of Agriculture recently started to implement some projects with the participation of local communities as a new approach to secure the involvement of people in rangeland development.
- The Ministry of Agriculture continued establishing rangeland reserves. The number of reserves is currently 28. These reserves will have positive effects on the protection of plant genetic resources, medicinal and herbal plants...etc.
- Efforts made for the development of rangelands through the implementation of water harvesting techniques showed strong potential for development, which was enhanced by the success of some farmers in establishing large farms using these techniques.

- Animal Feed Production

The production of livestock feed did not improve and Jordan remained dependent on imports. The quantity of imported feed reached 1.7 million tons in 2000 while the local production did not exceed 268,000 tons. Self-sufficiency receded to about 20.7 percent

6-2-3 Problems and Constraints

i. Livestock Production

- Red Meat Production (sheep, goats and cattle)
- Limited local production of forage hay and straw, especially in years of drought and periods of unavailability of rangeland for grazing.
- Lack of livestock breeder organizations (associations, cooperatives societies, and councils) to organize producers and assist them to share their views with government, during the formation of policies relevant to the development of the sector.
- Weakness of the agricultural extension services in the livestock sector, especially in the field of veterinary services.
- Competition of imported products with local produce.

- Insufficient number of slaughterhouses. Those that exist lack modern facilities for meat processing and preparation for market.

- Increased percentage of calf and lamb mortality that exceeds 20 percent for calves.

- Milk Production

- Limited forage production and high prices. Milk producers are also not trained in preparing balanced-feed meals.

- Poor extension and veterinary services in the field of small ruminants and cattle.

- Weakness of milk marketing systems and poor services provided for enhancing production and marketing of sheep and goat milk.

- Poultry Production

- Competition between local produce and high quality, subsidized European imported products.

- Technical and health problems that raise the mortality rate in poultry farms to about 20 percent compared to 10 percent in developed countries.

- Inadequate number of laboratories and diagnosis centers for poultry diseases with specialized veterinarians.

- High production cost due to increased cost of imported feed, which is the main component of production inputs.

- Fish Production

- Availability of only a small sea fishing area, which is also poor in fish.

- Limited fishing potential of internal waters.

- High cost of intensive fish farming.

- Shortage of local technical expertise in fish farming.

- Honey Production

- Lack of effective programs for development of small beekeeping projects at family level.

- Lack of coordination between farmers and beekeepers to prevent toxicity of bees by pesticides.

- Shortage in grazing areas available for honeybees.

- Competition of imported honey with local production.

- Lack of laboratories for the diagnosis of bee diseases.
- Shortage in national expertise in beekeeping.

ii. Animal Feed Production

- Increased number of grazing animals, exceeding that the carrying capacity of the rangeland.
- Early and over-grazing of rangeland and weak rangeland protection measures.
- Use of heavy trucks and modern transport means in the rangeland areas, which leads to soil degradation.
- Transferring ownership of rangeland in the steppe region to private sector, which resulted in its use for purposes other than grazing.
- Ploughing the rangeland and planting it with barely for claiming land ownership.
- Lack of adequate legislation for rangeland protection and the inefficiency of present legislation.
- Shortage of staff specialized in the development and management of rangeland.
- Lack of institutional coordination between organizations concerned with rangeland development.
- Lack of participation of the Badia population in rangeland development and management.
- Absence of feed and forage crops in the agricultural rotation, especially in the high-rainfall areas.
- Insufficient utilization of agricultural by-products as a source of livestock feed.
- Use of treated wastewater in forage production is still limited.

iii. Animal Health

- Shortage of trained and specialized staff in public and PS and limited budget allocated for animal health program.
- Lack of epidemic maps for infectious diseases.
- Weak veterinary extension services.
- Poor research in the field of epidemics and exotic diseases.
- Weak policies and programs relevant to animal health and poor enforcement of adopted policies and approved programs.
- Insufficient veterinary quarantines and their lack of essential requirements.
- Uncontrolled sheep movement across Jordan's borders.

1. Protect natural rangelands, organize grazing, and develop the productive capacity of rangeland resources.
2. Define land uses according to productive capacity, giving priority to the development of areas that have high potential of incorporating water-harvesting measures as an integral component of rangeland development.
3. Develop rangeland on the basis of integrated management approaches and local community participation.
4. Conserve agro-biodiversity and use it for rangeland development, and expand the establishment of natural and rangeland reserves.
5. Develop agricultural farming systems that integrate water-harvesting techniques in the development of rangeland.
6. Monitor environmental changes, and combat desertification.
7. Increase animal feed production, improve its quality, and introduce new feed resources.
8. Improve animal health services.
9. Increase the productivity of small ruminants.
10. Promote small family livestock projects.
11. Support livestock breeders' organizations and encourage the establishment of councils or specialized associations for production and marketing of produce and providing support services.
12. Protect local products from illegal competition in accordance with the provisions of free trade agreements.
13. Support integration between plant and livestock production.

6-2-5 Strategies for the Achievement of Objectives

Following is a summary of strategies to achieve the above objectives including programs, projects, and measures, (programs and projects are given in matrix shown in matrix No. 2-6).

Objective 1: Protect Natural Rangelands, Organize Grazing and Develop the Productive Capacity of Rangeland Resources.

Implementation Strategies:

- Update legislation relevant to land ownership and rangeland use, and organize users of rangelands (Program 1-Projects 1,2,4 and 5).

Objective 2: Define Land Uses According to Productive Capacity, Giving Priority to the Development of Areas that have High Potential of Incorporating Water-Harvesting Measures as an Integral Component of Rangeland Development.

Implementation Strategies:

- Complete the soil survey and classification project on a more detailed scale for areas where annual rainfall exceeds 100 mm (Program 2-Project 1).
- Diversify agricultural production systems through development of watersheds, using suitable water-harvesting techniques (Program 2-Project 2).
- Establishment of an agriculture information unit at the MoA using modern information systems (Program 2-Project 3).
- Train national staff in land-use planning and rangeland management (Program 1-Project 6).
- Develop communities in the rangeland areas, and study the characteristics of pastoral communities, identifying their socio-economic features, their distribution and movement (Program 3-Project 4).

Objective 3: Develop Rangelands on the Basis of Integrated Management Approaches and Local Community Participation.

Implementation Strategies:

- Evaluate rangeland areas to identify promising areas for development (Program 3-Project 2).
- Develop agricultural system in the watersheds through integrated management practices, crop diversification and water harvesting techniques and set priority programs for implementation (Program 3-Project 2).
- Promote the construction of rainfall water storage system and on-farm wells to reduce the impact of water shortage during dry seasons (Program 5-Project 2).
- Locate Wadi's with alluvial sediments that have promising areas and develop them for grazing purposes (Program 5-Project 4).

Objective 4: Conserve Plant Biodiversity and Use it for Rangeland Development and Expand the Establishment of Natural and Rangeland Reserves.

Implementation Strategies:

- Collect local plant landraces, describe their characteristics and conserve them in gene banks (ex-situ conservation) (Program 4-Project 1).
- Use of native plant species adapted to the local environments for the development of rangelands (Program 4-Project 1).
- Conserve native plants in their original habitats (in-situ conservation) in cooperation with local communities (Program 4-Project 2).

- Establishment of rangeland reserves on public lands to be managed by cooperative societies of livestock breeders, living in the reserve areas (Program 4-Project 3).

Objective 5: Develop Agricultural Systems that Integrate Water Harvesting Techniques in the Development of Rangelands.

Implementation Strategies:

- Limit government-financed rangeland development projects, to projects that integrate water-harvesting structures in the development plans (Program 5-Project 2).
- Provide soft loans to finance the construction of water-harvesting measures and the construction of haffeurs for livestock drinking and the rangeland development.

Objective 6: Monitor Environmental Changes and Combat Desertification

Implementation Strategies:

- Carry out hydrological studies for quantifying surface water availability in the rangeland, locating areas with promising productive capacity and suitable for development through the application of water harvesting measures (Program - Project 1).
- Construction of small earth dams and haffeurs to be used for the production of forages and as water points for livestock in areas where annual rainfall exceeds 100 mm (Program 5-Project 2).
- Development of lowlands and areas adjacent to waterways and planting them with crops suitable for growing under these special environments.
- Improve the natural vegetation in areas through the introduction of water-harvesting and water-spreading methods (Program 5-Project 2).
- Develop and/or rehabilitate rangeland giving priority to these close to the pastoral communities and those that can be developed with the participation of local population.
- Establish emergency assistance programs to mitigate the impacts of drought on local population (Program 5-Project 3).
- Introduce suitable crops for production of green fodder.
- Introduce spineless cactus in the agriculture production systems (Program 7-Project 3).
- Evaluate and monitor environmental changes and identify potential changes in agricultural lands that accompany the various land-use systems (Program 6-Project 1).
- Monitor the deterioration of natural resources (land, water and natural vegetation and those accompanying desertification) (Program 6-Project 1).
- Evaluate land and water resources and natural vegetation to determine the extent of degradation, their current productive capacities, and the environmental causes for this degradation (Program 6-Project 2).

- Evaluate the characteristics of the rangeland to identify their main problems in order to set priorities of mitigating environmental deterioration and to direct development efforts to areas with promising productive capacities (Program 6-Project 3).
- Establish a monitoring system for the natural vegetation and study agro-biodiversity to identify promising native plants species of agricultural importance and their potential use (Program 6-Project 4).

Objective 7: Increase Animal Feed Production, Improve its Quality, and Introduce New Feed Resources.

Implementation Strategies:

- Determine priority for the development of rangeland after assessing productive capacity and problems and constraints on their development (Program 3-Project 1).
- Develop watersheds using an integrated management approach based on diversified and integrated activities, focusing on water-harvesting measures and growing crops that provide greater opportunities for livestock feed production (Program 3-Project 2).
- Introduce new forage crops such as spineless Cactus, Acacia and Atriplex, using water-harvesting techniques (Program 3-Project 3).
- Develop areas neighboring to lowland and waterways that have suitable soils for growing forage crops (Program 5-Project 7).
- Construct small earth dams in selected areas for the production of forages and for use as livestock drinking points (Program 5-Project 2).
- Develop flood areas through growing suitable grazing plants or fodder shrubs (Program 5-Project 4).
- Rehabilitate and expand the construction of water collection structures (cisterns, pools) in areas neighboring "mud flats" (flat lowlands) (Program 5-Project 4).
- Reduce the gap between animal feed requirements and local production through processing agriculture by-products into animal feed (Program 7-Project 2).
- Introduce cactus in rain-fed farming systems (Program 7-Project 3).
- Promote the use of treated wastewater in the production of green forages (Program 7-Project 1).

Objective 8: Improve Animal Health Services:

Implementation Strategies:

- Conduct epidemic surveys on livestock diseases (Program 8-Project 3).
- Control the spread of exotic diseases (Program 8-Project 4).
- Raise the technical standards of staff working in animal health and increase their number (Program 8-Project 2).

- Establish a research center for poultry disease (Program 8-Project 1).
- Establish a laboratory for quality control of veterinary vaccines.

Objective 9: Increase the Productivity of the Small Ruminants

Implementation strategies:

- Improve the productive traits of small ruminants.
- Increase the productivity of sheep and goats (Program 9-Project 1).
- Increase the production efficiency of small ruminants in milk, meat and other products (Program 9-Projects 2,3).
- Improve the quality of produce (Program 9-Project 3).
- Increase breeders' incomes (Program 9-Projects 1,2).

Objective 10: Promoting Small Family Livestock Projects

Implementation strategies:

- Improve the productivity of bees and increase the number of beehives (Program 10-Project 1).
- Enhance research for improving bee keeping and develop needed laboratories (Program 10-Project 2).
- Establish special programs to finance small animal production projects at family level.

Objective 11: Support Livestock Breeders' Organizations and Encourage the Establishment of Councils or Specialized Breeders Associations for Production and Marketing of Produce and Provision of Support Services

Implementation strategies:

- Establish three specialized breeders associations or councils for milk production and marketing, red meat production and marketing, and for the production and marketing of poultry meat and table eggs.

Objective 12: Protect Local Products from Illegal Competition in Accordance with the Provisions of Free Trade Agreements

Implementation strategies:

- Provide all required staff, laboratories, and administrative units for effective protection of local products from unfair competition according to WTO agreements, namely arrangements for protection from damage, anti-dumping measures and protection from subsidized exports.
- Establish an effective mechanism for the protection of Jordanian traders and consumers from fraud trade practices according to WTO agreements, namely, Technical Barriers of Trade Agreement, Health and Livestock health Agreement, and Sanitary and Phytosanitary measures.

Objective 13: Support Integration Between Plant and Livestock Production

Implementation strategies:

- Develop and protect rangeland and organize their use (Program 7-Projects 1,2,3).
- Encourage the production of green forage crops using treated wastewater (Program 7-Project 1).
- Process agricultural by-products as a new source of animal feed (Program 7-Project 2).
- Plant cactus as farm fences and as feed (Program 7-Project 3).

2-6 Programs and Projects Matrix

The following matrix summarizes the suggested programs and projects, highlighting the main projects components including: justification, objectives, target area/groups, executing agency and partner organizations, duration, and implementation requirements.

Program 1: Rangeland Development

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1-Updating legislation of rangeland tenure and use.

- Continued rangeland degradation due to weak and inadequate legislation in rangeland management and organizing users.
- Define legal and technical gaps and weaknesses in existing laws and regulations.
- Amend current legislations to be consistent with rational management of rangeland.
 - Rangeland and their users.
 - MoA
- DSL
- RGC
- HCST

3 years

- Enact a new law of rangeland management.

- Secure funding.

2-Organization of rangeland users.

- Promote the implementation of rangeland protection projects based on successful experiments in rangeland management.

- Institutionalize participatory or consultative approach with local communities for rangeland management.

- Increase environmental awareness in pastoral communities.

- Rangeland users.

- ACC

- MoA

- TV and Radio corporation

- HCST

5 years

- Establish rangeland users cooperative societies and specify conditions for membership.

- Define areas allocated for use by rangeland users cooperative societies.

3-Development of rangeland resources.

- Degradation of rangelands.

- Good potential for increased productivity if proper management and appropriate development technologies are applied.

- Identify rangeland development technologies and water harvesting measures that proved to be effective in the Jordanian rangeland.

- Apply selected development approaches in some promising rangeland sites.

- Train and upgrading the technical skills of staff of the MoA.

- Update rangeland data.

- Make available seeds of plants and shrubs for planting.

- Promising range areas.

- MoA

- Badia Research and Development Project

- DSL

- RGC

15 years in three phases- each five years

To cover five million du at the end of project

- Provide technical and support services to ensure project success.

4-Management of Government rangeland.

- Replication of successful examples that have resulted in increasing rangeland productivity by establishing new rangeland reserves in promising areas.

- Protect natural resources by stopping wrong practices, improving feed productivity and following appropriate grazing systems.

- Contribute to achieving social and economic development in rangeland areas.
 - Livestock breeders and rangeland Directorates at the MoA.
 - MoA in cooperation with Governmental and non-governmental organizations.

5 years

- Enact legislation to prevent trespassing upon newly established reserves.
- Provide needed staff to implement project activities.

5-Rangeland evaluation and monitoring.

- Lack of a national system to follow-up and evaluate rangeland resources based on scientific approach.
- Establish a rangeland and livestock monitoring system using modern technologies including GIS and database to follow up and evaluate the conditions of rangeland and to establish an early warning system.

- Directorate of rangeland at the MoA.

- MoA

5 years

- Institutionalize cooperation among concerned agencies.

- Provide technical staff.

6- Training in land-use planning and rangeland management.

- Lack of trained staff in rangeland-use planning.

- Lack of trained staff in rangeland management.

- Train staff in land-use planning.

- Train rangeland users on modern methods of rangeland management.

- Rangeland users.

- MoA

- MoP

Continuous

- Establish special training unit in the Agricultural Extension Dept.

- Secure fund for training programs.

Program 2: Sustaining the Resource Productive Capacities

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Completion of soil survey and classification project.

- Lack of information on rangeland that is suitable for development.

- Lack of information needed to identify productive capacities of promising rangeland.

- Assess and describe the problems of target areas.

- Identify the promising areas, which could be developed.

- Provide the environmental data needed to evaluate the extent of resource deterioration and its causes.

- Specify rangeland uses for different purposes.

- Promising areas.

-MoA

-MoP

Ten-15 Years

- Establish land survey and classification section in the Ministry of Agriculture.
- Secure funds.
- 2. Diversification of production system through agricultural development of watersheds.
 - Lack of production systems to fully utilize land productive capacities.
 - Continued land deterioration.
 - Improve the utilization of water resources through the introduction of suitable production systems.
 - Improve farmer income.
 - Promising areas.

-MoA

-MoP

Continuous

- Establish a section for watershed management at the MoA.
- Secure soft loans for farmers in watershed areas.
- 3. Establishment of an agricultural information unit, using modern information systems.
 - Lack of data needed for integrated development.
 - Lack of staff trained in modern information systems.
 - Provide necessary information for development of target areas.
 - Collect, tabulate and analyze the information to facilitate its utilization in decision-making regarding agricultural development and sustainable resource utilization.
 - Areas included for development.

-MoP

-MoA

Continuous

- Establish an agricultural information unit at the MoA.

Program 3: Diversification of Resource Utilization in Marginal Areas

Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Land Resources evaluation.

- Lack of information and maps on the distribution of productive agricultural land and their capacities.

- Lack of information on problems facing land resource use in the different areas.
- Set priorities for development of promising land.

- Prepare development plans following identification of resource problems and constraints.
 - Promising Lands
- MoA
- Continuous
- Establish a section for evaluating land productive capacities in marginal areas.

- Secure the needed funds.

2. Agricultural development of watersheds for combating desertification.

- Accelerated resource deterioration.

- Urgent need to protect land productive capacities.
 - Diversify agricultural development activities.

- Maximize resource utilization

- Improve the natural vegetation and ensure its sustainable use
 - Selected watersheds
- MoA

-MoWI

Continuous

- Establish a section for watershed development and management at the MoA.

3.Planting fodder crops using treated wastewater and water harvesting techniques.

- Increased quantities of treated wastewater available for agricultural use.

- Shortage in local production of green fodder.

- Increasing cost of animal feed and consequently of sheep breeding.

- Avoiding adverse environmental impact resulting from non-control of wastewater use.
 - Diversify and improve agricultural production system.

- Improve farmer income.

- Provide an additional source of livestock feed.
 - Areas with rainfall of 100-200 mm
- NCARTT
- Continuous
- Secure needed funds.

4. Development of the agricultural communities in the rangeland areas.

- Weakness of collaboration and coordination between government and non-government organizations in the field of planning and implementing local communities development projects.
 - Construct a development model suitable for application in the various agricultural systems through:
 - Involving all organizations working with farmers in preparing a development plan for the targeted local community, which aims at developing a frame to implement suitable rural development strategies

- Increasing the agricultural resource productivity.

- Integrating plant and livestock production.

- Combining the efforts of different organizations working in local community development to establish a suitable mechanism for the development of the target communities.
 - Population settlements in the rain-fed areas, which depend on growing barley and livestock breeding in the North, Middle and South Jordan.

- MoA
- NCARTT
- CS
- NGOs
- Ten Years
 - Conducting demographic and socioeconomic studies for the targeted areas.
- Identify partners to be involved in project implementation and cooperating local leaderships.
- Collaborate in implementing suitable technologies for increasing productivity.

Program 4: Protection of Plant Biodiversity in Rangeland Areas
Project Title

Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Collecting and describing native plant species, and their ex-situ conservations.
 - Increased extinction probabilities of some endangered native plant species of agricultural importance.
 - The need to introduce new forage plants in the production systems.
 - Collect and describe native plant species in the various environments.
 - Ex-situ conservation of the plant species.
 - Identify the promising species and their use to improve rangeland productivity.
 - Facilitate access to local genetic resources by the organizations and institutions involved in development.
 - Wild plants
 - All areas
 - MoA
 - NCARTT
 - Universities
 - Continuous
 - Establish gene banks for plant preservation.
 - Financing of needed studies.
 - Support scientific research.
2. Use of native plant species in rangeland development
 - Threats of extinction of endangered plant species.
 - Adaptability of native plant species to the local agro-ecological conditions.

- Some species are endangered in their natural habitats.
 - Use promising plants in the development of rangeland areas.
 - Maintain agro-biodiversity.
 - Protect some plant species from extinction.
 - Protect endangered species of plants in their native habitats. (in-situ-conservation).
 - 1 to 2 selected areas
 - MoA
 - NCARTT
 - Universities
 - Continuous
 - Financing of field studies.
 - Research support.
- 3.Establishing rangeland reserves on government-owned rangelands.
- Shortage in livestock feed and increasing cost of livestock breeding.
 - Rangeland degradation due to uncontrolled use.
 - Develop rangeland areas with users participation.
 - Improve rangeland productivity.
 - Selected sites
 - Cooperative societies
 - MoA
 - RSCN
 - Continuous
 - Establish associations for rangeland users.

Program 5: Development of Agricultural Systems Depending on Water Harvesting Techniques

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Determination of total quantity of available surface water in rangeland areas.
 - Lack of sufficient information on surface water quantities available for development.
 - Determine surface water quantities available for agricultural use.
- Identify potential areas for development where surface water is available.
 - Areas along waterways.
 - MoA
- MoWI
- MoP
 - Five to Seven Years.
 - Finance field studies.

2. Carrying out water- harvesting measures in the rangeland areas.

- Rain and floodwater are not efficiently utilized.
- Loss of most of surface water through evaporation.
- Shortage of water points for livestock.
- Low rangeland productivity due to limited amount of rainfall.
- Large shortage in forage production.
- Utilize water resources available in the water drainage areas.
- Increase the production of animal feed.
- Improve natural vegetation and the productive capacity of rangeland.
- Provide drinking water for livestock.
- Drainage areas.
- Promising rangeland.
- Farmers and livestock breeders.

-MoA

-MoWI

-MoP

Ten Years

- Conduct the needed studies.
- Provide funds.

3. Setting a mechanism for mitigating drought impacts.

- Frequency of drought affecting rangeland production.
- Lack of diversified productive systems that endure drought conditions.
- Reduce risks faced by livestock breeders during drought seasons.
- Provide drinking water for livestock during drought seasons.
- Various livestock breeders.
- All areas.

-MoA

-MoP

Continuous

- Set diversified productive systems.
- Provide soft loan and assistance to affected farms and livestock breeders in years of drought.

4. Development of lands adjacent to the (mud flats) and Wadis covered by recent sediments for forage production.

- Shortage in local green forage production.
- Increasing cost of livestock breeding.
- Loss of water by evaporation.
- Ensure utilization of floodwater, which accumulates in the mud flats.
- Increase cultivated areas.
- Increase the production of trees and livestock feed.
- Areas adjacent to mud flats.

- Wadi areas covered with recent sediments.
- Livestock breeders.
- MoA
- MoP
- Establish rangeland users cooperatives societies.
- Provide soft loans to societies.

Program 6: Environmental Chances Monitoring and Desertification Control

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Monitoring environmental changes and combating desertification.

- Accelerating desertification.
- Deterioration of land productivity.
- Decreasing productive capacity of rangeland.
- Identify activities causing desertification.
- Provide information on the rangeland areas and the extent of desertification.
- Specify practical measures to be used for desertification control.
- Set priorities for development of areas subject to desertification.
- Areas where rainfall is less than 200 mm.
- Promising rangeland areas.
- MoA

-MoE

-NCARTT

-Universities

Five to Seven Years

- Establish a directorate at the MoA specialized in the issues of environmental changes and desertification.
- Carry out field studies,
- Establish data base on rangelands.

2. Evaluation of natural resources (land, water and natural vegetation).

- Lack of information on natural resources and their availability for agricultural use.
- Accelerating rate of deterioration of rangeland.
- Provide information on rangeland and natural vegetation.
- Identify promising plant species and their habitats.

- Specify suitable means for using these species in the development of target rangeland areas.
- Areas where rainfall is less than 200 mm

- Promising areas.
- MoA

-MoP

Five to Seven Years

- Establish a section at the MoA specialized in evaluating land, water, and natural vegetation of rangeland.

3. Priority setting for rangeland development project based on their role in mitigating environmental deterioration.

- Lack of priority list for development of various rangeland areas.
- Lack of comprehensive policy for the development of rangeland areas.
 - Classify areas according to established development priorities and criteria for halting deterioration and establish priority list of intervention.
- Set basic principles for development of target areas.

- Areas where annual rainfall is less than 200 mm.

- Promising areas.
- MoA

-MoP

-NCARTT

-Universities

Ten to 15 Years

- Finance field studies.

- Establish a special unit or strengthening of the development directorate of the MoA to conduct the studies.

- Finance field studies.

4. Monitoring natural vegetation and studying biodiversity.

- Accelerated extinction of plants with potential use in rangeland development.
- Lack of information on endangered plant species.
- The need to use biodiversity in comprehensive development.
 - Monitor the deterioration of natural vegetation and identify promising endangered plant species.
- Define suitable measures to protect plant biodiversity.
- Identify available and promising local wild species of plants for use in rangeland development.
 - Areas with annual rainfall less than 200 mm.

- Promising areas.
- M oA

-M oP

-NCARTT

-U niversities

Five to Ten Years

- Finance studies.

Program 7: Development of Livestock Feed Resource

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Using treated wastewater for forage processing production.

- The need to solve the actual problem of shortage in local production of green fodder.
- Increasing availability of treated wastewater and the importance of using it safely.
- Encourage the farmers to grow forage crops in areas near wastewater treatment plants.
- Use wastewater in productive systems that protect the environment.
- Farmers.
- Livestock breeders in areas where treated wastewater is available.
- PS
- MoA
- MoP
- Five Years
- Identify suitable agricultural land available in the vicinities of wastewater treatment plants.
- Improve the efficiency of wastewater treatment plants.
- Enact legislation that prohibits the use of produced livestock feed unless dried in accordance with WHO requirements.

2. Processing of agricultural by-products into animal feed.

- Acute shortage in animal feed and availability of large quantities of unutilized agricultural by-products.
- Produce livestock feed at reasonable prices to contribute to the reduction in production cost.
- Increase local production of livestock feed.
- Avoid some of environmental problems caused by the non-disposal of some agricultural by-products.
- Waste producers.
- Livestock breeders.
- Private sector (investment)
- MoA
- Universities
- AMC
- Five Years
- Conduct studies to identify agricultural by-products and methods of processing them into livestock feed.
- Provide incentives for the private sector to invest in this field.

3.Planting Spineless Cactus.

- Severe shortage of livestock feed.

- Potential for introducing multipurpose varieties of cactus (Fruits and livestock feed).
- Produce livestock feed to meet part of growing demand.
- Areas with rainfall exceeding 200 mm.

- Livestock owners
- MoA
- Ten Years
- Supply cactus seedlings by MoA at acceptable prices.

- Provide technical and administrative staff to supervise project implementation.

Program 8: Development of Animal Health Services

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Establishment of a research and diagnosis center for poultry diseases.
 - Large losses caused by diseases.

 - Lack of integrated program to prevent infection and to control disease outbreaks.
 - Diagnose and determine the extent of spread of poultry diseases and impacts.

 - Protect chicks from infection and devise methods of control.

 - Test imported poultry vaccines.

 - Educate and train technicians and laborers in the poultry sector.
 - Poultry breeders.

 - .
 - MoA

 - Faculty of Veterinary Medicine (FVM) at the Jordan University of Science and Technology / JUST
- Five Years
- Prepare final document of the project by the MOA and the FVM at JUST.
-
2. Improve skills and competence of veterinarians and workers in the field of animal health.
 - Diagnosis of diseases and epidemics are not timely.

 - Lack of specialized staff capable of dealing with and controlling epidemics.
 - Improve the efficiency of veterinarians and maximize their contribution to the development of the livestock sector.

 - Update and raise the efficiency of veterinary support staff.
 - Veterinarians

-Workers in the field of livestock

-Livestock breeders.

- MoA

- FVM/JUST

- VA

Four Years

- Hold training courses for Veterinarians and livestock breeders in cooperation with the Veterinary Association and FVM/JUST

3. Survey of major epidemics in domestic animals and establishing a database for these diseases.

- No system exists for identifying and mapping of animal diseases for control purposes.

- Map the main epidemic diseases of domestic animals in Jordan.

- Create a database for each disease.

- MoA

-Research centers in Jordan

- MoH

- MoA

- CVM/JUST

- MoH

Five Years

- Provide technical staff and allocation of needed funds.

4. Improving the effectiveness of the veterinary quarantine.

- Weakness of the veterinary quarantine system at international boarder, checkpoints, airports and Aqaba port.

- Protect livestock resources from incoming livestock diseases.

- Protect Jordan from diseases shared by humans and animals.

- Train veterinarians and technicians on veterinary quarantine work and the diagnosis of animal diseases.

- Cattle breeders in the areas from veterinary quarantine buildings.

- MoA

- JUST

Four Years

- Provide necessary staff.

- Revisit and update the veterinary quarantine legislation.

Program 9: Increasing the Productivity of Small Ruminants

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Sheep and goats productivity increase.

- Limited use of available rural family labor and on farm products in livestock breeding at farm level.
- Increase milk and meat production,
- Introduce modern breeding systems regarding management, feeding and animal health.
- Train farmers in livestock management and introduce registration and record keeping systems.
- Sheep and goat breeders in various areas.
- MoA

- CC

- SPP

Five Years

- Detailed preparation of the project by the MoA.

- Provide the required staff and supporting services.

- Determine the number of farmers interested in joining the project.

- Secure funding.

2. Breeding and fattening of sheep and goats and processing of their products.

- The breeding method used by breeders is traditional and negatively affect sheep and goats productivity.
- Lack of intensified ,integrated and field-tested breeding model that attracts investments.
- Produce good quality meat and dairy products through good management, nutrition and handling of produce.
- Use modern technology in breeding, feeding of animals and processing of produce.
- Encourage the private sector to invest in this type of activities.
- Area where needed infrastructure exists, preferably near to MoA livestock breeding centers.
- MoA

- Private Sector

- Universities

Three Years

- Prepare pilot project document and fix the number of participating breeders.

- Provide support services by the MoA.

3. Frozen embryo use for biodiversity conservation.

- Unavailability of this type of technology in livestock sector.
- The importance of this technology in supporting research and development in the livestock sector.
- Preserve and protect the native and endangered animal species.
- Farmers and researchers in universities and scientific centers.
- VC/JUST

- MoA

Three Years

- Provide required funds.

Program 10: Beekeeping Development

Project Title Justification

Objectives Area and/or target group

Executing agency and partner organizations

Duration

Implementation requirements

1. Development of beekeeping in Jordan.

- Low productivity of beehives.
- Absence of projects for the production of queens and improved swarms.

- Increase the productivity of beehives.
- Establish a database including the number of beehives and beekeepers.
- Produce queens and locally improved swarms.
- Increase the number of beehives in accordance with available bee grazing area.
- Areas of beekeeping in Jordan
- Beekeepers.
- MoA
- Jordanian Bee Keepers Association.
- Universities.

Ten Years

- Enact legislation for the protection of beehives from insecticides.
- Prepare specifications for local honey.
- Ensure participation of all agencies concerned with honey production and marketing in project activities.

2. Establishment of a research center for honeybees.

- Insufficient information available regarding beehive numbers, distribution and bee diseases.
- Shortage of experts in beekeeping.
- Conduct relevant research and studies.
- Prepare technically qualified staff either from farmers or technicians at the MoA.

- Establish a laboratory for bee products and diseases.
 - Beekeepers
 - MoA

 - Universities
- Five Years
- Establish the required research center at MoA.