Towards a Green Economy in Jordan

A SCOPING STUDY

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Glossary

AFD	Agence Française de Développement
AGGP	Amman Green Growth Program
Bbl	Barrels of Oil
CEA	Country Environmental Analysis
CO_2	Carbon Dioxide
EE	Energy Efficiency
EIA	Environmental Impact Assessment
EPA	Environmental Protection Act Law
EU	European Union
GAM	Greater Amman Municipality
GCEP	Global Climate and Energy Project
GDP	Gross Domestic Product
GEF	Global Environmental Facility
IUCN	International Union for Conservation of Nature
JCPP	Jordan Cleaner Production Program
JD	Jordanian Dinar, equivalent to US$1.41
JGBC	Jordan Green Building Council
JREEF	Jordan Renewable Energy and Energy Efficiency Fund
MCM	Million Cubic Meters
MENA	Middle East and North Africa
MOE	Ministry of Environment
MSMEs	Micro, Small and Medium Sized Enterprises
mWs	Megawatts
NERC	National Energy Research Center
NOx	Nitrogen Oxide
RE	Renewable Energy
RSCN	The Royal Society for the Conservation of Nature
SWM	Solid Waste Management
SO2	Sulphur Dioxide
TSP	Total Suspended Particulate
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar

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1 . EXECUTIVE SUMMARY

Jordan is one of the smallest economies in the Middle East, with a total GDP of US $27.5 billion and a population of 6 million, of which 13.3 per cent live below the poverty line[1]. Unlike other neighbouring Arab countries, it is a non-oil-producing country with limited natural resources and minerals. The country faces persistent unemployment, in addition to a growing budget deficit and inflation.

Jordan's economy is dependent on services including tourism and transport activities that provide 66 per cent of GDP. Industry contributes 30 per cent of GDP while agriculture counts for less than 4 per cent. Like many other developing countries, it has a rapid population growth of about 2.5 per cent (DoS, 2006). Furthermore, the nation is experiencing increased pressure on natural resources, widening income disparities and growing poverty. Countrywide, access to freshwater represents the most pressing challenge - both in quantity and quality. This is followed by the relative scarcity of arable land and the acceleration of desertification, soil degradation and deforestation. Recent estimates of 2009 place the cost of environmental degradation at 2.35 per cent of the GDP in 2006.

The government of Jordan is currently supporting various policies, initiatives and programmes aimed at achieving a green economy, such as: the complete removal of subsidies for oil in 2008; the adoption of the renewable energy law and fiscal incentive package on renewable energy and energy efficiency equipment in 2010; and, the establishment of the Eco-Cities Forum, the Eco-Financing Seminar and the Zarqa River rehabilitation project. In addition, the government's 2010 Executive Programme highlights its pursuit of green economy development, by documenting the need to "launch a programme for green services and industries to meet the requirements for adhering to environmental standards and turning Jordan into a regional centre for green services and industries."

This Scoping Study reviews the current state of investments in Jordan and implications for a transition towards a green economy. The study looks at the economic, social and environmental challenges of Jordan, and identifies the sectors that appear to offer a significant potential for green investment to drive a transition towards a green economy. These sectors relate to energy, water, transport, waste management, agriculture and tourism.

In total, investment in environmental conservation could generate an estimated 50,000 jobs, and over JD 1.3 billion in revenues over a period of 10 years, as is shown in the report. In order to achieve such benefits, this study recommends an integrated and coordinated approach that involves all sections of the government, the private sector and civil society, starting with the production and adoption of the Green Economy Policy Paper.

The United Nations Conference on Sustainable Development to be held in Rio de Janeiro, Brazil, in 2012 (also known as Rio+20) will set the stage for countries like Jordan to individually and collectively address a green economy in the context of sustainable development and poverty eradication and to foster regional and international cooperation.

This study has identified green economy opportunities and issues in the following areas:

Energy sector

- With over 13 per cent of GDP spent on energy imports, scaling up the development of alternative energy sources and enhancing energy efficiency in buildings and industrial processes are critical.
- Investment in energy efficiency in industry, which is estimated around 195 million JD annually for the coming 10 years, can save the nation one-fifth of its energy usage over the next 12 years. Methods to promote energy conservation include, for example, taxing

excessive energy use, improved insulation and energy efficiency of homes, and incentivising the use of lower voltage bulbs and devices.

- The economic benefits of shifting towards cleaner energy in Jordan include saving on imports, a smaller trade deficit, less inflation and increased employment.
- The Jordan National Energy Strategy is set to generate approximately 3,000 new jobs for the installation, maintaining and running of renewable energy facilities by 2020.[2]
- There is a need, however, for an enhanced legal and institutional framework to support the implementation of existing policies, such as the Renewable Energy Law, and for more incentives to encourage the use of renewable energy technologies.

Transport sector

- The transport sector is responsible for about 37 per cent of total energy demand in Jordan, and thus it is considered an important driver for determining future national energy needs.
- The transportation sector is a two-mode system, namely, road, which covers almost all domestic passenger and freight transport, and air. Enhancing public transport would contribute to: reducing energy consumption; creating a more mobile workforce and thus reducing structural unemployment, particularly for those living in rural areas; and, enhancing the competitiveness of the national economy.
- Promoting cleaner fuel vehicles use can help save JD 40 per vehicle annually, and even more as gasoline prices increase further, which translates to JD 44 million in savings per year.
- The financial resources saved from greening the transport sector could be channelled into creating approximately 9,500 new jobs per year in a country where unemployment has ranged between 12.5 and 15.3 per cent, and structural unemployment is exceptionally high.
- Policies to green the transport in Jordan, could include revising customs policies on clean fuel and zero emission vehicles, and streamlining public transportation with interchangeable tariffs and routes that best serve employment-intensive areas.

Water sector

- Jordan is ranked third among the 18 countries in the world considered to be at risk for water insecurity. If present trends continue, between 2030 and 2050, the country's (surface) aquifers will be severely drained. Furthermore, 80 per cent of the land area will transform from "semi-arid" to "arid".
- Up to 51 per cent of the country's water is wasted and around 35 per cent of households are not connected to a sewerage system. Thus, an immediate goal is to improve the conservation and efficient use of water.
- Water losses total about JD 100 million annually, which is almost one-third of total environmental degradation. Reducing water usage by one-fifth could save up to 200 million m^3 of water.
- The water and agricultural challenges in Jordan are closely related. Indeed, the agricultural sector currently accounts for 71 per cent of water demand and 64 per cent of supply, while only about 5 per cent of the land is considered arable.
- In addition to policies already in place, a rehabilitation of wetlands and better allocation of water to relevant economic activities could optimise the economical productivity of water.
- The Jordanian government is seeking US $3.1 billion for water management projects. Investment in improved water systems is expected to create an estimated 31,000 jobs.

Waste sector

- Current collection rates of solid waste are estimated at 90 per cent and 70 per cent in urban and rural areas, respectively.
- Management of hazardous and medical waste needs to be substantially improved, since most of the former is disposed of with no treatment; whereas half of the latter is treated in outdated incinerators located in populated areas, and the other half is mixed with municipal waste in open dump sites.

- Measures to improve Jordan's Solid Waste Management (SWM) system following a model developed in the capital city of Amman include a more comprehensive and detailed legislative framework, and a full sector strategy. In addition, cost recovery rates will need to improve to alleviate the resource constraint that hinders the SWM system in many municipalities.
- Recycling benefits vary country by country, but in general, energy savings have been shown to range from 24 to 95 per cent, and air pollution savings from 20 to 95 per cent.

Organic and sustainable farming

- Jordan is a net food importer, importing 60 per cent of the food consumed while approximately 20 per cent of its agricultural production is exported. Agriculture in Jordan is exposed to cyclic droughts and unpredictable frosts.
- The contribution of agriculture to GDP, at current prices, declined steadily from 14.4 per cent in 1971, to 3 per cent in 2009. However, through backward and forward linkages, an estimated 28 per cent of the GDP and 20 per cent of Jordan's exports are related to agricultural activities.[3] The sector supports livelihoods for about 20 per cent of the population and employs directly about 7 per cent of the labour force. Livestock accounts for about half of the total agricultural GDP.
- The agriculture sector is the largest consumer of water in Jordan. Over the past 15 years, the productivity of Jordanian farmland has dropped by half due to over-use of soils and a rapidly increasing population (due in part to a large influx of refugees).
- Sustainable agriculture, including organic farming, can ease the pressure on precious water and soil resources. For example, organic farming relies on water saving techniques that can increase the size of the irrigated land by a ratio of 6 in Jordan.
- If 5 per cent of the total agricultural land is used as organic farmland, this will lead to approximately JD 111 million in investments, 40.6 thousand dunums in total land used and the creation of 1,700 jobs.

Sustainable tourism, eco-tourism

- Tourism makes up roughly one-tenth of GDP. It is the largest export segment and second biggest private sector employer, with over 90,000 people employed in 2010.
- The development of sustainable tourism requires the informed participation of all relevant stakeholders, a high level of tourist satisfaction, raising awareness about sustainability and promoting sustainable tourism practices amongst them.
- Various eco-tourism pilot projects in Jordan have created jobs and sustainable incomes for local communities. Furthermore, eco-tourism projects were found to benefit other sectors at risk, such as water and agriculture, and to preserve endangered plants and animals.
- If 5 per cent of all tourists used sustainable infrastructure, then approximately 3,900 jobs could be created annually based on past expenditure and employment ratios.
- Increased awareness campaigns could further the development of sustainable tourism in Jordan. These campaigns could be funded in part from income generated from such tourism.

2 . INTRODUCTION

2.1 OBJECTIVE OF THE STUDY

The overall objective of this Scoping Study is the achievement of economic, social and environmental priorities through improved climate change adaptation, efficient use of resources in different sectors of the Jordanian economy, domestic policy reforms and the strengthening of institutional and human capacities. The specific objectives are:

- To assess key opportunities and challenges for greening the Jordanian economy and creating green and decent employment; and
- To identify priority areas for promoting green investment and related policy reforms, and to provide policy options.

2.2 GREEN ECONOMY DEFINITION

UNEP defines a green economy as one that results in "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP 2011). A green economy is one that is low-carbon, resource efficient and socially inclusive. Growth in income and employment is driven by public and private investments, enabled and facilitated by policy reforms. In the context of developing countries, a green economy challenges the myth that there is a trade-off to be made between economic growth and development on the one hand, the environmental and resource conversation and sustainable use on the other.

2.3 JORDANIAN GOVERNMENT COMMITMENT TO GREEN ECONOMY

Under Jordan's National Agenda (2006-2015), "environmentally-sustainable economic development" is a key policy goal reflected in a wide range of sectors, including energy, transport, and waste management. Within its 2010 Executive Programme, the Government of Jordan announced the launch of "a programme for green services and industries to meet the requirements for adhering to environmental standards and turning Jordan into a regional centre for green services and industries".

Jordan's environmental protection efforts as well as the scarcity of natural resources were the motivations behind the adoption of the first Environmental Protection Act Law (EPA) and the establishment of the Ministry of Environment (MoE) as a separate ministry in 2003. Since its establishment, the MoE has:

- Spearheaded efforts to improve treatment of industrial wastewater, medical and hazardous waste, working in partnership with the private sector.
- Enhanced the inspection system through updated and comprehensive regulations, which are soon to be adopted.
- Played a key role in the establishment of the Environmental Rangers Department in 2006, which has helped to improve the effectiveness of vehicle and industrial inspection and enforcement, in addition to assisting in the fight against illegal logging.
- Promoted environmental protection and prevention of pollution in partnership with local NGOs.

Jordan ratified the UNFCCC Kyoto Protocol in 1993, and the MoE became the national focal point for climate change issues. In 1996, Jordan started its climate change mitigation efforts with a GEF-UNDP supported programme for capacity building in documenting national emissions of GHG and preparing the country's national communication to the UNFCCC. The Second National communication was published in 2009.

The MoE is currently involved in various projects including:

- **The Jordan Cleaner Production Program (JCPP)**: launched in 2002 together with 11 Jordanian governmental and non-governmental organizations as a programme which aims to improve profits through the application of environmentally friendly industrial processes. The programme is a means to transfer knowledge and technology to Jordanian producers, thus facilitating their access to international markets.
- **The Eco-Cities Initiative:** launched in 2010, this initiative allowed the creation of the Jordan Green Building Council (JGBC) and led to a workshop on Green Financing, the enhancement of a national programme on Clean Production, and the proposed tax exemption of hybrid cars.
- **The Electric Cars Project:** consists of an effort of MoE to stimulate private sector investment in zero-emission vehicles in partnership with major car manufacturers and dry battery manufacturing companies.
- **Rehabilitation of the Zarqa River Basin (2008-2020)**: a joint project of the Ministry of Environment and IUCN.
- **A green economy strategy for Jordan (2010-2012**): launched in 2010 jointly by the Ministry of Environment, Ministry of Planning and UNEP to assist the country in the implementation of its 2010 Executive Programme on green economic development.

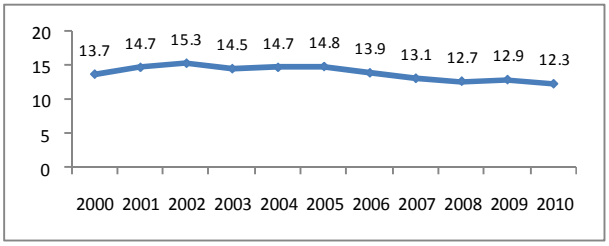
In addition, different ministries and state institutions have departments dealing with environmental issues. Their main mandate is the protection and/or measurement of pollution rates in Jordan.

3 . Overarching Challenges for the Jordanian Economy

3.1 Unemployment

The Jordanian population is overwhelmingly young, as one-third of the population is below 15 years of age, and 60 per cent of the population falls between 15 and 65 years of age.

FIGURE 1: UNEMPLOYMENT RATE IN JORDAN (%), 2000-2010



Source: Department of Statistics, www.DOS.gov.jo

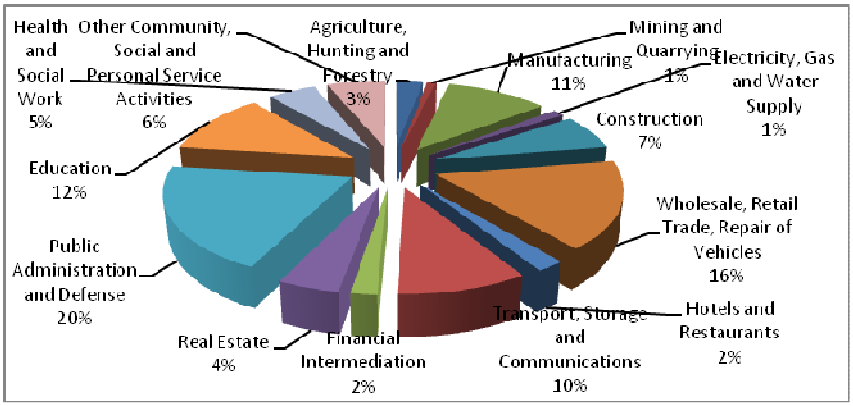
However, unemployment is chronically high, hovering between 12.3 and 15.3 per cent[1], and seems to increase despite economic growth. Figure 1 shows the unemployment trend for the overall economy (2000-2010). The labour market suffers from a severe structural unemployment due to a mismatch between a) the skills of job seekers, b) the demand in the labour market; and c) the perceived better working conditions in government offices that offer a higher than average pay, social security and health insurance, less working hours and greater

1 Available IMF statistics covering six countries—Egypt, Jordan, Lebanon, Morocco, Syria, and Tunisia—indicate that average unemployment stood at 11 percent in 2008, barely below the average of the past two decades (12 percent) and the highest regional unemployment rate worldwide (IMF, http://www.imf.org/external/np/vc/2011/052011.htm).

job security than the private sector. As a result, a large share of the labour force is employed by the public sector (as shown in Figure 2), which is a specificity of MENA countries[4]. Furthermore, lack of adequate transportation networks tends to limit workers' geographic mobility, leading to regional disparities in employment. Hence, while job openings do exist, they are taken up by guest workers. The number of guest workers equals and sometimes exceeds the number of the unemployed; and it surpasses the number of Jordanians working in the Gulf.

Part of the problem is that manufacturing, which is generally labour-intensive, receives a limited share of private investment and FDI, compared to real estate investment which mainly employs low-skilled guest workers. Based on Department of Statistics figures, an investment of US $20,000 can create one long-term employment position in the manufacturing sector. Finally, as studies in other world regions have shown, while lower real wages tend to improve international competitiveness, they hardly alter the labour-intensity of production (in the short and medium term)[5].

FIGURE 2 : EMPLOYMENT DISTRIBUTION, PERCENTAGE PER ECONOMIC ACTIVITY IN JORDAN 2009

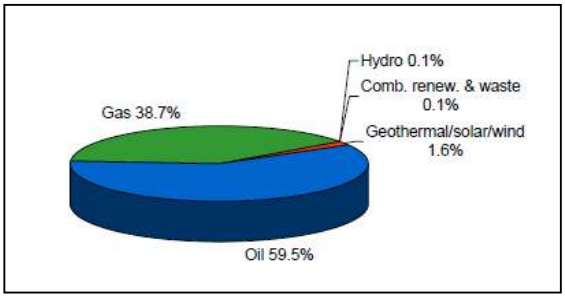


Source: Department of Statistics, www.DOS.gov.jo

3.2 ENERGY SECURITY

Approximately 13 per cent of GDP in 2009 was spent on energy. Virtually all of the nation's energy is imported (only 4 per cent is produced or found locally) to meet the large demand for oil and gas[6]. Jordan relies on Egyptian gas for 80 per cent of its electricity needs.

FIGURE 3: SHARE OF TOTAL PRIMARY ENERGY SUPPLY* IN JORDAN IN 2008

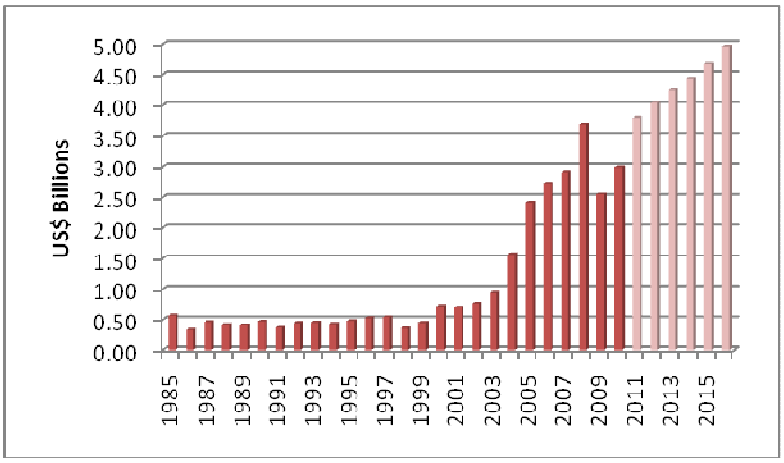


Source: OECD/IEA 2010[8]

Note: * Share of TPES excludes electricity trade. For presentational purposes, shares of under 0.1 per cent are not included and consequently the total may not add up to 100 per cent.

Power demand is expected to grow by 7 per cent yearly between 2010 and 2020[9] . Energy use generates approximately 14.9 million tonnes of greenhouse emissions.[10]

FIGURE 4 : VALUE OF OIL IMPORTS FOR JORDAN, 1985-2016



Source: IMF country statistics, 2011

Fuel imports have been growing at a slow pace, on average of 2.5 per cent annually, during the past five years. This is just under the average population growth rate. Two factors affect national energy expenditure: oil prices and economic growth. The 2008 Survey of the Department of Statistics Income and Expenditure showed that 5.1 per cent of national expenditure was on fuel alone. This figure is expected to substantially grow over the coming two decades under a business as usual (BAU) scenario, as oil prices are expected to increase continuously over the next decades.

In 2008, Jordan completely removed its subsidies for gasoline and other oil derivatives. The subsidy removal resulted in a substantial rise in oil prices and led to a slight decrease in fuel consumption and created new opportunities for the growth of cleaner energy sources. The subsidies were however reinstalled and today are still in place.

A study published in 2009 found that current energy policy which heavily relies on oil imports is adversely impacting the growth of industrial production[11]. For example, an increase in energy prices by 10 per cent leads to a decrease in industrial output, as measured by the Industrial Production Index, of 1.6 per cent. The study estimated that a 200 per cent increase in energy prices would lead to an increase in unemployment of 51,000 workers in industry; a loss to the government of JD 120 million in direct and indirect taxes; a 7.25 per cent decrease in GDP and a drop in gross output of JD 2.34 billion[2].

Recent interest in extracting oil from shale oil, which is found in abundance in Jordan, may contribute to additional local energy production. The World Energy Council estimates that Jordan has roughly 50 billion tonnes of oil in its oil shale reserves.[12] Several projects are under consideration, including a project by Royal Dutch Shell which could trigger investments of US $20 to 25 billion over a period of 12 to 20 years[13]. Other agreements have been made between the Natural Resources Authority and companies such as Estonia's Eesti Energia and Brazil's Petrobras. If Eesti Energia's 2008 feasibility study proves accurate, then one of Jordan's oil shale deposits could produce 36,000 barrels of oil daily (over one-third of the country's oil needs). However, shale oil extraction is showed to be water-intensive and could have significant environmental impacts.

[2] based on 2006 data

In its effort to identify alternative sources of energy to fossil fuels, Jordan has been exploring the possibility of developing nuclear power capacity. In 2007, it established the Committee for Nuclear Strategy and delineated a programme for nuclear power to provide 30 per cent of electricity by 2030 or 2040, which could also be exported. The nuclear law was modified in 2007 to establish the Jordan Atomic Energy Commission (JAEC) and the Jordan Nuclear Regulatory Commission (JNRC), including radiation protection and environmental roles. JAEC's functions include safety and security, nuclear science and technology, safeguards and verification. However, water needs, waste management, environmental pollution and decommissioning are serious issues that need to be further considered. In addition, a full cost-benefit assessment of nuclear energy must be conducted vis-à-vis other sources of sustainable energy resources such as wind and solar technologies, which have an enormous potential for generating the energy that the Kingdom needs.

3.3 Resource Endowment and Use

Jordan faces significant environmental challenges, including water scarcity, air quality, land degradation, biodiversity conservation and solid waste management.

Water scarcity and agricultural growth

Jordan is one of the most vulnerable countries to climate change impacts, primarily due to the fact that its ecosystem productivity is highly dependent on the hydrological cycle. According to the Water Stress Index, a measure of the rainfall divided by the total population, Jordan is categorised as a country with "absolute scarcity" of fresh water resources[14]. Due to water scarcity, mining of renewable groundwater resources has led to increased salinity, falling water table levels and increased pumping costs. If present trends continue, between 2030 and 2050, Jordan's (surface) aquifers will be severely drained and vegetation could plummet. Furthermore, 80 per cent of the land area will transform from "semi-arid", to "arid".[15]

The water and agricultural challenges in Jordan are tightly related as the agricultural sector currently accounts for 71 per cent of water demand. Yet only about 5 per cent of the land mass is considered arable. The contribution of agriculture to Jordan's GDP, including forestry, declined from 6 per cent in 1995 to 3 per cent in 2009 mainly due to drought and inefficient water use. However, because of upstream and downstream linkages, about one quarter of the GDP is considered as agriculture-dependent.[16]

Air quality

Transport, power generation and industry account for the bulk of air emissions, particularly TSP, SO_x and NO_x. The vehicular fleet grows at a rate of 7-10 per cent per year. In a country of almost six million people, there are over 1.07 million vehicles. High customs and registration fees (an average of 81 per cent over the import price) on cars may have been behind the spread of old vehicles and their continued use, leading to more polluting combustion technologies in vehicles.[17] Mining and cement production further contributes to the air pollution, especially in the old Cement factory in the city of Fuhais, which is located near a residential area.

Recent policies aimed at improving fuel quality, such as phasing out leaded gasoline and high sulphur diesel, and diversifying energy resources such as the use of gas-fired power plants, are important but have had a limited impact. About 95 Octane unleaded fuel is more expensive than the 90 per cent Octane -leaded fuel, and the gas supply from Egypt has suffered from intermittent and unexpected interruptions and fluctuations in supply. The shift to unleaded gas was completed in 2008.[18]

Forests

Forests make up less than 1 per cent of Jordan's land area. The forests area is threatened due to cutting down trees for fire wood, crop cultivation, overgrazing, water scarcity and salinity and investment projects. From 1990 to 2005, the rate of forest loss amounted to 13 million hectares annually[19]. Reforestation could potentially expand Jordan's forest cover from the current 1 per cent of land area to 13 per cent. The environmental gains of reforestation could be significant. There have also been efforts by local and international contributors to plant trees in order to restore Jordan's green cover. In 2008, the Arbor Society planted 30,000 trees across the country.

For Jordan, anti-desertification efforts are as important as the efforts to halt deforestation. In 2005, the government displayed the "National Action Programme to Combat Desertification", and in 2007, a plan for sustainable land use was developed. There have also been plans for modern irrigation and soil protection. Under such plans, the areas designated as "Nationally Protected Areas", will increase and monitoring strengthened. Three new locations have been created, and more are proposed over the next few years. A new division of 400 Environmental Rangers was established specifically trained to prevent environmental violations.[20] There is a need to properly enforce the laws and regulations that pertain to forest protection.

Solid waste management (SWM)

Current collection rates of solid waste are estimated at 90 per cent and 70 per cent in urban and rural areas, respectively. Amman accounts for almost half of total solid waste generation. However, safe disposal remains a concern as most of the municipalities (Amman being the exception) discharge solid waste into open dump sites with no lining, leachate management, or biogas collection.[21]

Land use management

- **Rural-to-Urban Migration**: The number of citizens living in urban areas almost doubled from 40 to 72 per cent between 1952 and 2004.[22] This is due to rural-to-urban migration and the fact that foreign immigrants usually prefer to settle in cities rather than rural areas. Combined, the three largest cities (Amman, Zarqa and Irbid) made up 71.4 per cent of the population in 2009. Rising rural-to-urban migration leads to increasing pressure on housing, basic amenities, increased demand for food, rising inequalities, solid waste and solid waste management.

- **Land Degradation:** The productivity of rangeland, a crucial source of livelihood for most of the rural poor, has dropped by about 50 per cent in the last 15 years, primarily due to overgrazing, the inflow of refugees from the first Gulf war, and the encroachment of urbanisation. A programme funded by the United Nations Compensation Commission (UNCC) for the rehabilitation of the Badia is underway.

Cost of environmental degradation to the economy

Jordan does not have a system for monitoring environmental degradation and its costs to the economy. A study of the World Bank conducted in 2009 estimates, with conservative figures, the cost of environmental degradation to be equivalent to 2.35 per cent of the country's GDP in 2006. However, a World Bank study in 2010 stated officially that the cost of environmental degradation was JD 330 million annually, or 5% of the GDP.[23] Table 1 below shows the cost of environmental degradation by main category.[24]

TABLE 1: COST OF ENVIRONMENTAL DEGRADATION BY CATEGORY IN JORDAN

Category	(% of GDP)	Mean (mil JOD)
Air	1.15%	114.8
Water	0.81%	83.1
Waste	0.23%	22.9
Soil	0.11%	10.7
Coastal Zone	0.06%	5.9
Total	**2.36%**	**237.4**

Source: World Bank Jordan CEA 2009

4 KEY SECTORS IDENTIFIED FOR GREENING THE ECONOMY

The challenges outlined above point to a few sectors that appear to be of particular importance to reduce environmental risks and resource constraints facing the Jordanian economy and society. In addition, green investments in the priority sectors identified could potentially contribute to new economic growth, employment, and poverty reduction.

4.1 ENERGY

A. PRIMARY ENERGY SUPPLY AND DEMAND

The vast majority of energy needs in Jordan are supplied through oil imports. Electricity demand, which reached 2,100 megawatts in 2007, is expected to increase to 5,770 megawatts by 2020. The demand for oil, presently at 7.6 million tons, is predicted to double to reach 15 million tonnes, by 2020.[25]

Given that Jordan has to import approximately 100,000 barrels of oil per day, upward fluctuations in oil prices can increases both the trade deficit and the balance of payments deficit, while placing pressure on the demand for foreign currency. Local production and consumption are also adversely affected as oil prices increase, which tends to affect employment and economic growth rates, and, consequently, poverty. Before the spike in oil prices and consequently the prices of other commodities, the GDP grew by 7.6 per cent in real terms. As prices of fuel and commodities rose in 2009, and the Central Bank of Jordan adopted a conservative monetary retrenchment policy, the GDP growth declined to 2.3 per cent. Notwithstanding these challenges, Jordan has been actively seeking to reduce its reliance on fossil fuels from current 96 per cent to approximately 61 per cent of energy usage by 2020.[26]

With only 21 per cent of its residents living in rural areas, and scattered across the country, Jordan has long given more attention to the densely populated cities. However, certain initiatives have been undertaken to address the energy needs of the rural communities. For example, a Rural Electrification Project has provided energy to 579 rural villages.[27]

B. ENERGY POLICIES

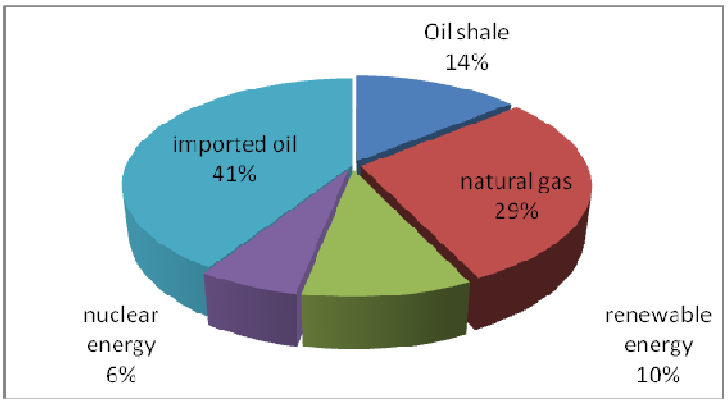
Jordan pursued sector reform by implementing the energy components of the National Social and Economic Development Program for 2009-2011, and the Energy Master Plan for 2007-2020. The draft Integrated Energy and Minerals Law, which includes the establishment of an energy regulator, was taken back from Parliament in December 2009 for amendments tackling minerals and oil refineries. Previously part of the integrated energy and minerals law, a new Renewable Energy Law was passed as temporary law No. 3 in January 2010. In the oil sector, in

September 2009, the Government gave exclusive concession rights (with guaranteed prices) to Jordan Petroleum Refinery Company with a view to expanding and upgrading the refinery. Jordan continued to work on expanding independent power production and reducing electricity network losses. It pursued the development of indigenous gas and oil shale resources by signing agreements with private investors.

The National Energy Strategy 2008-2020 aims to supply 29 per cent of energy needs from natural gas, 14 per cent from oil shale, 10 per cent from renewable energy resources (the previous goal was 3 per cent in the 2005 National Agenda) and 6 per cent from nuclear energy by 2020[28]. The investments needed to meet this target ranges from approximately US $1.4 to $2.2 billion. The strategy aims at decreasing oil usage from almost 60 per cent presently to 40 per cent by 2020. Furthermore, the strategy calls for Build, Operate, Transfer (BOT) ventures, for wind and solar energy facilities, producing 660 megawatts and 600 megawatts, respectively.[29]

As a result of the sudden increase of world oil prices in 2009, the government adopted a fiscal incentive to exempt all RE & EE imports from custom and sales taxes. Other aspects of the strategy include economic and fiscal incentives, such as grants and tax exemptions to encourage the usage of energy efficient vehicles (e.g. hybrid vehicles), the removal of sales tax on solar water heaters and the formulation of building code regulations that foster efficient energy usage[30]. Figure 5 shows the projected energy requirements in 2020.

FIGURE 5: PROJECTED ENERGY PORTFOLIO OF THE NATIONAL ENERGY STRATEGY IN JORDAN BY 2020



In response to the many energy challenges, the energy strategy of Jordan emphasises:

i. Significant progress in and expansion of, all types of clean energy technologies
ii. Encouraging prudence in energy usage, and cost effective demand management
iii. Sustainable economic growth and ecological preservation
iv. Creation of an energy grid, utilizing renewable sources, to be supplied to rural areas[31]

The Renewable Energy and Energy Efficiency Law No. (3) of 2010 was ratified as temporary legislation in February 2010 by the parliament[32] with the following objectives:

- Exploiting renewable energy sources for increasing the percentage of their contribution to the total energy mix.
- Contributing to environmental protection and achieving sustainable development by promoting the exploitation of Renewable Energy.
- Rationalising the exploitation of energy and improving its efficiency in various sectors[33].
- Creating the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) as a financial incentive to further investments and development of RE &EE.

- The law permits local and international companies wishing to establish renewable energy projects to bypass the competitive bidding process and negotiate directly with the Ministry. Additionally, the law establishes fixed feed–in electricity tariffs, which are not implemented yet. Other incentives include a complete income tax exemption within its first decade of operation for any industrial investment in renewable energies.[34] The law also specifies metering policies for residential and small RE producers, in order to encourage low-scale renewable energy supply, via residents selling electricity to their local area at market prices. It makes the purchasing of renewable energy by the National Electric Power Company compulsory. The company will also have to pay for connecting these renewable energy supplies, including solar and wind energy, to the nation's electrical infrastructure.[35]

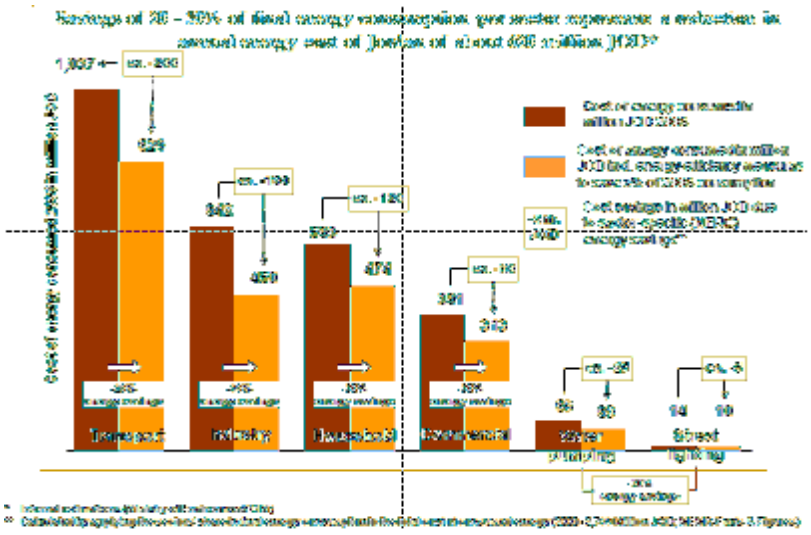
In order to meet the objectives of 7 per cent of the Kingdom's energy mix generated from renewable energy sources by 2015, and 10 per cent by 2020, the Government of Jordan envisions installing 600 megawatts (MWs) of new wind generation, between 300 MW and 600 MW of new solar power generation capacity, and 30-50 MW of biomass projects over the next decade.

It should be noted that there is a fear from policy makers in Jordan of increasing the budget deficit with investments in renewable energy. However, should the price of oil increase drastically in the near future, investments in renewable energy would serve as a strategic source of sustainable energy and have a less detrimental impact on the national budget as it would lead to significant savings on annual subsidies.[36]

C. Potential Cost Savings From Clean Energy Technologies

Renewable energy resources can safeguard an economy against fluctuations in energy prices, but they must also be accompanied by increasing energy efficiency to round out energy policy in a green economy. The nation can save one fifth of its energy usage over the next 12 years, by promoting energy conservation, taxing excessive energy use (for example, the driving of SUVs), improving insulation, adopting energy efficiency labels, increasing the energy efficiency of homes and using lower voltage bulbs and devices which allow for the dimming of lights.[37] Figure 6 shows costs for energy consumption with and without energy-efficiency cost measures and the resultant savings per main sector.

FIGURE 6: COST SAVINGS FROM ENERGY EFFICIENCY, 2008-2010 IN JORDAN



Source: Ministry of Environment, 2010

In Jordan's second National Communication to the UNFCCC (2009)[38], 38 GHG mitigation projects were proposed in the areas of primary energy, renewable energy, energy efficiency, waste, and agriculture. The cost, benefits and CO2 emission reduction are analyzed for each proposed project, indicating that the areas that offer the biggest potential are fuel switch, the promotion of natural gas and renewable energy, especially wind energy, and energy efficiency. If executed, these projects would lead to annual reductions of 2,761 thousand tonnes of CO2 eq. in 2009; and expected to increase to 12,345 thousand tonnes of CO2 eq. in 2033, representing 9.7 per cent and 17.5 per cent from baseline emissions; respectively (Table 2).

TABLE 2: COST CURVE FOR GREEN HOUSE GASES IN JORDAN

GHG	% of 20140 Gg Equivalent emissions in 2000	% of 70377 Gg Equivalent emissions in 2033
CO_2	84.6	93
Methane	13.6	6.5
N_2O	1.7	0.3

Source: Jordan's second national communication to the UNFCCC (2009)

Table 3 below shows the total cost saving, payback period and investment required for several enterprises in Jordan in 2010. It appears that in all cases, the payback period is short and the savings would be much higher in the case of rising fuel prices.

TABLE 3: POTENTIAL OF IMPROVING ENERGY EFFICIENCY- JORDANIAN CASE STUDIES

Company name	Total cost saving (JD/year)	Energy consumption (JD/year)	Saving/ year %	Pay back period (yr)	Investment required (JD)
Arab Center For Health And Special Surgery	67,989	313,832	22%	1.8	123,102
Movenpick Resort & Spa Dead Sea	76,821	665,625	12%	0.8	60,052
Movenpick Resort Aqaba	86,449	358,223	24%	1.9	164,819
Four Seasons Hotel (Amman)	120,307	648,569	19%	1.4	170,670
Jordan Kuwait Bank	17,854	103,505	17%	1.3	23,579
Industrial Development Bank	4,020	33,065	12%	2.9	11,711

Source: Ministry of Environment, 2010 NERC

D. Clean Energy Finance

The Jordanian government has been working towards facilitating investments in the renewable energy sector through various mechanisms. Clean sustainable energy initiatives that support the initial funding of pilot projects include:

- The Jordanian Renewable Energy and Energy Efficiency Fund (JREEEF): will be devoted to the support of energy-saving and renewable energy initiatives. Private sector companies or investors from within or outside the country can apply to the fund, which will be financed by the state budget and international donor agencies. The government has allocated JD 20 million to the JREEEF.[39] The Fund has already received financing (US $1 million) from the Global Environmental Facility (GEF) through the World Bank and Euro 1.56 million from the French Global Environmental Facility (FFEM) through the Agence Française de Développement (AFD); other international agencies such as the German Development Bank and the Japan International Cooperation Agency have expressed interest in offering assistance.

- The World Bank 'Clean Technology Fund,' allocated US $112 million for Jordan, in order to assist with the construction of the Solar Plant in Ma'an, and the power line between Qatraneh and Samra.[40] However, Jordan has sofar declined the offer, referring to its already large budget deficit and growing governmental debt.[41]

- An initiative launched in 2010 by the Ministry of Environment in cooperation with the World Bank/IFC and AFD, is leading the way forward to establish Green Financing in commercial banks in the Kingdom.

E. SUSTAINABLE ENERGY INVESTMENT AND JOB CREATION

The Renewable Energy and Energy Efficiency Law will bring in a steady stream of investment into environmental technology in Jordan, increasing employment and added value in the sector. Regarding the education of young people in environmental maintenance, one positive example of this initiative is the Jordan-German University, where young people are taught about the most advanced technologies and techniques in water and energy conservation.[42]

Jordan has been actively seeking to tap into opportunities offered by the global carbon market, in particular through Clean Development Mechanism (CDM) projects. The MOEMR created the Al-Russaifah Bio Gas Company which produces 1.7 MW of electricity from land fill gas. The country is attempting to classify 13 current projects as CDM, particularly in the areas of water usage and transportation.[43] In September 2009, Jordan obtained Euro 1.5 million, for the sale of carbon credits, resulting from the operation of the Aqaba Thermal Power Station, a CDM project that costs approximately US $500,000. The plant is predicted to earn Euro 23 million over the next five fiscal years. The earnings from all of Jordan's CDM projects were expected to amount to approximately 6 million Euros for 2010.[44]

Jordan has agreed to five CDM projects, which are expected to lessen CO_2 emissions by 3.5 million tonnes and generate 100 million Euros over the coming five fiscal years. Approximately 15 per cent of the income generated from CDM will go towards the Environmental Protection Fund, assisting new and existing firms that utilise environmentally sustainable technology and waste minimisation processes.[45] CDM projects could therefore contribute to expanding investments in projects able to stimulate new employment creation.

Internationally, for every 100 MW solar plan, almost 400 full-time equivalent manufacturing jobs are created. For every 600 contracting and installation jobs of renewable energy products, 30 annual jobs in operations and management are created.[46]

The Green Jobs Report (UNEP, ILO, IOE and ITUC 2008) estimated that, with strong policy support, up to 2.1 million people could be employed globally in wind energy and 6.3 million in solar PV by 2030, and around 12 million in biofuels-related agriculture and industry. Solar PV offers the highest employment rate, with 7 to 11 jobs per megawatt of average capacity, which partly explains the high costs of this technology at present (see Table 4). This employment rate is likely to decrease alongside PV costs.

TABLE 4: AVERAGE EMPLOYMENT OVER LIFE OF FACILITY (JOBS PER MEGAWATT OF AVERAGE CAPACITY)

	Average Employment Over Life of Facility		
	Manufacturing, construction, installation	Operation & maintenance/ fuel processing	Total
Solar PV	5.76-6.21	1.20-4.80	6.96-11.01
Wind power	0.43-2.51	0.27	0.70-2.78
Biomass	0.40	0.38-2.44	0.78-2.84
Coal-fired	0.27	0.74	1.01
Natural gas-fired	0.25	0.70	0.95

Source: UNEP, ILO, IOE and ITUC (2008)

The Jordan National Energy Strategy is set to generate approximately 3,000 new jobs, for the installation, maintaining and running of renewable energy facilities by 2020.[47] However, one of the main constraints to advancing rural renewable energy in the developing world is the lack of available skills. Many of the developers and engineers in this sector have a minimal knowledge of the materials, structures and production methods needed for energy efficient structures and buildings. Therefore, there is an absolute need to invest in education and training, for the installation of green technology. The Ministry of Environment is also implementing a rural solar electrification micro project programme by building the technical capacity of Bedouin women to train, build and maintain solar energy.

4.2 TRANSPORT

The transport sector is responsible for about 37 per cent of total final energy demand in Jordan, and thus it is considered an important driver for determining future national energy needs. The main modes of transport in Jordan are land-based (passenger and freight), maritime, aviation and railway transport. Each of these modes has its own law and regulatory structure. Significant progress has been made in Jordan since the year 2000 in setting up legal and regulatory structures for the whole transport sector; institution building; promoting private sector investment in transport infrastructure; and creating a framework to enhance trade and transport facilitation.

A. CURRENT TRENDS IN PUBLIC TRANSPORT

In an effort to transform Jordan into an established regional economic and transport hub, the Jordanian government is investing approximately JD 1.26 billion within a 25 year-long plan to develop an extensive domestic public transportation network. Studies have been conducted for the development of a national railway system, able to connect the cities to each other, and with bordering countries.[48]

In 2009, there were approximately 1.07 million vehicles in Jordan, 3,176 of which were public buses.[49] Approximately 47 per cent of Amman's residents use public transport, compared to 43 per cent in 2004, while the remaining 53 per cent still use private vehicles. By 2015, the share of the Amman's population relying on public transportation is expected to reach 65 per cent. Of those who use public transportation, 62 per cent do not have cars. The monthly income of 85 per cent of public transport users is less than JD 400 a month.

Public transportation has also become more affordable. The Public Transport Regulatory Commission and the Greater Amman Municipality (GAM) have agreed to reduce public transport costs by 7 per cent as of December 2008. GAM also chose to reduce bus fares by 8 per cent for travellers who use smart cards and 5 per cent for those paying with cash.[50]

Currently the Amman Public Transportation Strategy involves reducing the time passengers spend waiting for public transportation vehicles to a maximum of 10 minutes. Amman's new planned transportation network will be multi-modal and functional. It will include a Light Rail Transit line of 42 km in length through a network of three lines, with spaced stations over bridges and tunnels. A 32 km Bus Rapid Transit system with dedicated bus lanes will also be put into place. The Amman-Zarqa railway project will be developed utilising the build, operate and transfer procedure, over three decades. Total costs for the Light Rail Transit and Metro line is JD 813 million, in addition to an extra JD 166 million for the Bus Rapid Transit line, to be implemented in collaboration with the private sector.[51] The railway will extend over 26 km, along the old Hijaz railway line and is expected to be completed by 2011. The train will contain 36 carriages, and travel at an average speed of 5.36 minutes per trip.[52]

B. Transport Demand

The lack of proper public transportation networks has been a major driver behind the rise of demand for private vehicles and resulting traffic congestion. When the light railway system is implemented (by 2015), it is predicted that approximately 100,000 individuals will revert to this means of transportation instead of their traditional automobiles.

Out of Jordan's 1.07 million vehicles in 2009, only 0.38 per cent were hybrid cars. In 2008, the government removed customs duties and taxes on hybrid vehicles, thus offering an incentive to purchase more fuel efficient, environmentally friendly vehicles. Since customs duties and taxes almost equal the price of a car itself, this would be a strong incentive for purchasing fuel efficient vehicles.[53] The fees on these cars vary between JD 1,000 to JD 4,000, with the size of the vehicle's engine. As a result, almost 4,800 hybrid automobiles have passed through the Free Zone since 2009, with 18 per cent coming in the first three weeks of December. Many cars were rushed through due to fears that the government may cancel tax exemptions on hybrid cars.[54]

One perceived limitation of this policy is that the government decision did not discriminate between large and small engine vehicles. Hence the demand for large vehicles such as SUVs that are hybrid also increased. The Ministry of Environment attempted without success to limit the benefit of the exemption of custom duties to hybrid vehicles less than 2,000 cc only.[55]

However, in 2010 Jordan reinstalled customs duties of up to 55 per cent for hybrid cars.[56] Demand for hybrids thus decreased; according to the Department of Customs, only four hybrid vehicles entered Jordan from May to December 2010.

C. Green Transport Investments and Job Creation

Limited access to public means of transportation affects employment opportunities for many reasons, particularly for rural households that do not own private cars. The first is that employers are less likely to locate jobs in areas without access to transportation. The second is that residents themselves have more difficulty accessing jobs outside of their community. Finally, the lack of public transportation deprives a community from opportunities to stimulate the local economy.

The average environmentally friendly car saves JD 40 per vehicle annually, and even more as gasoline prices rise further, which translates to JD 44 million per year saved across the nation. Such savings could free up revenues for purchasing other goods or services, or simply to foster domestic savings as Jordan currently has one of the lowest saving rates in MENA. Given that the average investment required to create a job for one person in Jordan is JD 13,712[57]; thus, the financial resources saved from greening the transport sector could be used to create approximately 9,500 new jobs.

Employment opportunities for Jordan could also arise from the development of an infrastructure support system for efficient mode of transportation. In 2010, in a bid to minimise the impacts of car emissions and encourage green investments, the Jordan Ministry of Environment signed two agreements with three companies with the objective to create a battery manufacturing company, a solar charging network, and to introduce zero emission vehicles into the Kingdom, using energy created from renewable energy sources.

4.3 Water Use

A. Current Trends in Water Supply and Use

The Security Risk Index, issued by risk analysts and the mapping group Maplecroft, rated Jordan third among 18 countries at "extreme water-security risk", with 15 of the countries located in the Middle East North Africa (MENA) region. In 2007 total water supply in Jordan was at 951 million m^3. Annual per capita water availability has declined from 3,600 m^3/year in 1946 to 145 m^3/year in 2011**.** The average Jordanian uses 160 m^3 annually – well below the international poverty line for water of 500 m^3. The new sources of water supply are expected to increase the available water from the current level of 850 million m^3 per year to 1,289 million m^3 per year by 2020. Among the resources, Jordan used 77 million m^3 of non-renewable groundwater against 80 million m^3 of treated wastewater. Currently, the Disi Water Conveyance Project is under construction to supply Amman with 100 million m^3 per year from a fossilised water aquifer in the south of Jordan.[58]

The total cost of water production at the source is influenced by initial capital costs, type of water treatment and energy cost. In Jordan, the average cost is US \$0.71/m^3, the capital costs for water production for all water projects were estimated at US \$0.68/m^3, and operation and maintenance costs were estimated at US \$0.28/m^3. The marginal cost (the additional cost incurred from producing an additional unit of output) of developing new water sources in Jordan is US \$0.37/m^3 for wastewater treatment in Amman, US \$0.41/m^3 for groundwater treatment, US \$1.00/m^3 from the Jordan valley and US \$1.00/m^3 from dams (Raddad, 2000) [59].

Infrastructure: Jordan's water resources are located away from its population centers, adding to the challenges of water access and supply. In addition, Jordan obtains most of its water from rainfall during the winter months. The water deficit has exceeded 500 million cubic meters in recent years, mainly to climate change caused drought, and will most likely continue to grow annually.

TABLE 5: DAMS AND CAPACITIES IN JORDAN

Dam	Current Storage Million m^3	Storage Percentage	Total Capacity Million m^3
Arab	9,505	56.61	16.79
Sharhabil	1,383	34.90	3.96
Talal	34,666	46.22	75
Karameh	21,351	38.82	55
Shuaib	1,226	85.76	1.41
Kafrain	2,800	31.13	8.45
Tannour	11,045	65.65	16.80
Waleh	8,176	99.99	8.18
Mujib	20,022	67.15	29.82
Total	**110,179**	**51.15**	**214.44**

Source: Ministry of Water and Irrigation, 2011

Water resources and water balance: The Jordan River, Yarmouk River, and Zarqa River are the main surface water sources in Jordan. However, much of the flow of the Jordan and Yarmouk rivers is diverted before it arrives in Jordan within Israel and Syria. The Zarqa River is polluted by industry and municipal wastewater. Similarly, the King Talal Dam, Jordan's second largest surface water reservoir faces low water levels, and while pollution of its waters was common, this has now improved with the construction of the new As-Samra wastewater treatment plant.

Water services: According to a study by the University of Michigan conducted in 2008, major Jordanian cities (Amman, Zarqa, Irbid) receive water approximately once a week; while more rural areas receive it once every 12 days approximately.[60]

Sewer services: Only 57 per cent of households and only 3 per cent in rural areas are connected to the sewerage system. The rest use sanitation solutions such as septic tanks; which if not lined properly can lead to contamination of groundwater aquifers.

Wastewater treatment and reuse: Jordan's first wastewater treatment plant was established in 1970. Currently, there are 22 treatment plants treating about 107 million m^3/year or about 98 per cent of the collected wastewater. Water is reused mainly for irrigation in the Jordan Valley, with a small share allocated to industry. As of 2006, only 14 per cent of the wastewater was being reused. A Jordanian-German cooperation initiative plans to mix the treated wastewater with freshwater and further treat it.

B. Water Demand

By 2020, the total demand for water is expected to increase to 1,685 million m^3 due to increases in population and expansion of economic activity. Jordan's population currently at 6 million is expected to surpass 7.8 million by 2020.

Water demand was estimated at 1,505 million m^3/year in 2007. The deficit was partly filled through pumping from non-renewable aquifers (90 million m3/year), desalination (10 million m^3/year) and, most importantly, overexploitation of renewable aquifers. The Ministry of Water and Irrigation plans to review regulations governing underground water resources to end over-exploitation. The Ministry's executive programme requires US $7 billion for the next 25 years to explore new water resources and protect and develop existing ones. Lack of enforcement is a cause of illegal water access, which accounted for 20-22 per cent of a total of 42 per cent of water loss by the end of 2010. Table 6 shows water deficit by sector with the largest deficit being in irrigation agriculture.

TABLE 6: WATER DEMAND, SUPPLY AND DEFICIT PER SECTOR IN JORDAN IN 2007 (MILLION MCM)

Sector	Demand	Supply	Deficit
Tourism	8	8	**0**
Industrial	49	72	**-23**
Municipal	366	284	**82**
Irrigation	1080	587	**493**

Source: Ministry of Water and Irrigation

C. Water Policy Considerations

In 2009, the Water Demand Management Unit of the Ministry of Water and Irrigation, with the support of USAID and Development Alternatives Inc., successfully completed a programme called Instituting Water Demand Management (IDARA). IDARA is the largest and perhaps most comprehensive demand reduction initiative in the world. Water demand savings included a 40

per cent reduction in water demand from the implementation of a new advisory building code, and a 15-20 per cent reduction in water demand from residential areas involved in the programme. IDARA also involved private sector companies such as HSBC Bank as partners.[61]

Policies such as the Jordan Water Strategy 1997, the National Water Master Plan (2005) and the Jordan National Agenda (2005) have all underscored the need. The government is ambitious to increase the water supply and increase the treatment of wastewater, including plans to increase water capacity from 130 million m^3 to 240 million m^3 by 2020. The more immediate goals, however, are to improve conservation and water treatment: up to 51 per cent of water is wasted in Jordan and around 35 per cent of households are not connected to a sewerage system.[62]

Important projects are under consideration to expand access to water. One such project is the Disi Water Conveyance Project, a large-scale project to pump water from the Disi aquifer situated close to the Saudi Arabian border. In addition, the Red-Dead Canal, if implemented, would take water from the Red Sea to the Dead Sea and provide water for Jordan, Israel and Palestine through the desalination process.

Progress is being achieved in the development of sanitary infrastructure. For example, the percentage of households with a connection to a sewage network increased from 48 per cent in 1990 to 65 per cent in 2007.[63]

The Water Demand Management Policy in Jordan revolves around the management of water demand of all the sectors in the Jordanian economy. Many of the policies are in practice already. The specific policy considerations include:

1. Universal Water Metering and Loss Control
2. Fulfilling “Unserved” Water Demands
3. National Plumbing Standards and Water Conservation Codes
4. Water Pricing and Cost Recovery
5. Comprehensive Water-Use Information Program
6. Public Awareness and Education
7. Best Management Conservation Practices
8. Public Buildings Efficiency Improvement Program
9. Water Demand Management Research and Development
10. Recognition of Individuals, Institutions and Industry for Advancement in Water Efficiency

A study conducted in 2000 suggests that, in order to optimise the productivity of water usage, the following measures are also needed:[64]

- Constraints on domestic consumption.
- Rehabilitation of wetlands.
- Estimation of value added per cubic meter of water in each economic sector.

In the agricultural sector:

- Estimation of gross margins (the total revenue received by a business over a period of time) per cubic meter of water for each crop.
- Estimation of real cost of water to decide allocation of water between crops.

D. Water Management Investments and Job Creation

The water shortage is currently being kept at bay by the resumption of constant pumping from the Zara Main Plant. Furthermore, 42 new water wells have been dug, with a total capacity of 20 million m^3 and a reduction of water loss in infrastructure by 2 per cent, which has saved the country 5.5 million m^3 a year.

As part of the national strategy to address the water shortage, the Jordanian government has begun plans to build a water desalination plant in Aqaba. The JD 30 million plant will be set up on the southern shores of Aqaba with a capacity of 5 million m^3 annually.[65]

Among the largest projects that are currently underway is the "Disi Water Conveyance Project", which is expected to supply Amman, where 38 per cent of the population lives, with 100 million m^3 of water yearly. The predicted expenditures for this project amount to just over JD 1.4 billion. The price of water from this project will amount to at least JD 0.74 per cubic meter.[66] Presently, water for home use costs between JD 0.56 to JD 0.850 per cubic meter.[67]

Other projects currently in the pipeline, for the period following 2010, and for which the government is still seeking funding include the aforementioned Red-Dead Canal Project, which in addition to increasing water supply, will also revive the Dead Sea's falling water line.[68] This environment-focused project seeks to divert one billion cubic meters of water yearly for the purpose of increasing water availability in the rapidly diminishing lake by 93 meters, to 315 meters below sea level.[69] The project requires the building of a 200 km long canal, connecting Aqaba to the Dead Sea, thus offering approximately 850 million m^3 of usable water yearly, as well as producing hydro electrical energy.[70]

In May 2008, the Ministry of Environment floated a tender to build an industrial wastewater treatment plant in Zarqa, where approximately 52 per cent of the factories in the Kingdom is located.[71] Many other wastewater treatment plants are under construction in other parts of the country. In addition, the Jordanian government is expected to sponsor US $3.1 billion in water management projects.

The Ministry of Environment attempted in 2010 to minimise power and water usage in government buildings, in conjunction with private firms. The purpose of this project is to cut energy and water usage by one fifth, and to recycle office waste in these buildings, primarily by implementing building codes. Cutting power usage by one fifth could save US $1 billion yearly, while cutting water usage by one fifth could save up to 200 million m^3 of water. Water losses result in the nation losing JD 100 million yearly, which represents almost third of the total environmental degradation which costs 5 per cent of the Jordanian GDP.[72] The total job creation from moving toward a green economy in water is over 31,000 jobs.

4.4 Waste Management

A. Current Trends in Waste Management

Current collection rates of solid waste are estimated at 90 per cent and 70 per cent in urban and rural areas, respectively. Amman accounts for almost half of total solid waste generation. However, safe disposal remains a concern in most of the municipalities, Amman being the exception.[73] Management of hazardous and medical waste is inadequate, since most of the former (totalling 23,000 tons in 2001 and expected to increase to 68,000 t/year by 2017) is disposed of with no treatment; whereas half of the latter is treated in outdated incinerators located in populated areas, and the other half is mixed with municipal waste in open dump sites.[74] Key issues to be addressed to improve Jordan's SWM system following Amman's example include the need for a more comprehensive and detailed legislative framework, as well as a fully formulated sector strategy and policy. In addition, cost recovery rates will need to improve to alleviate the resource constraint that hinders the SWM system in many municipalities.

In 2007, the Jordanian government ratified regulations guaranteeing the prosecution of any individual or firm caught dumping toxic materials, or in any other way negatively affecting the environment. The government has also promoted households switch to natural gas instead of oil, and continues to encourage biogas plants.

B. Green Investment and Job Creation

The privately created "Entity Green Training" firm, which develops and administers vocational training programmes, affordable housing programmes, and sustainable living initiatives, has developed a recycling project, thus giving scavengers a legitimate job and a stable source of income. Entity Green Training already has a complete recycling program, with training and employment for individuals living below the poverty line. In the previous year, 56 scavengers came out of training, ready to locate, gather and package recyclable material.[75]

Amman's main garbage dump, Ghabawi landfill, receives 2,200 tons of waste daily, and Jordan as a whole generates approximately 1.5 million tonnes of waste annually. Recycling bins will continue to be distributed to different locations throughout Amman. The Municipality has approximately 4,300 employees and 290 trucks covering Amman. Furthermore, Al-Russaifah Biogas Waste to Energy project has been operational since 2000 and the Greater Amman Municipality is evaluating the possibility of expanding and rehabilitating the project.

The recycling benefits from this project are varied, but energy savings have been shown to range from 24-95 per cent and air pollution savings from 20-95 per cent. The Greater Amman Municipality started the process of recycling. In areas such as Wadi Seer, Zahran and Bader, waste is sorted into paper, plastics glass and other categories and re-used.[76]

In the first phase alone, 1,000 recycling bins were spread across these areas of the municipality. In April 2010, the Greater Amman Municipality (GAM) announced the launch of the first phase to build a treatment plant for hazardous and medical waste in cooperation with the MOE; the project is supposed to be completed by June 2012.[77] A more comprehensive approach will be ISWM (Integrated Solid Waste Management) through active public-private partnership and private involvement and ownership in the sector.

4.5 Agriculture and Food

A. Current Trends in Agriculture

Only about 5 per cent of Jordan's land mass is considered arable, while the country is among the world's most water-deficient countries. The challenge for the Government is, therefore, to promote sustainable use of natural resources. The area of arable lands does not exceed 4 million dunums, less than 1 dunum per person. The lands cultivated under rain fed conditions represent 80 per cent of the total agricultural area. In 2008, the total agricultural land distribution was as follows:

- 1.56 million dunums planted with olive and other trees
- 0.42 million dunums planted with vegetables
- 1.08 million dunums planted with field crops
- 0.9 million dunums left as fallow and unplanted areas

Following sector reforms, agriculture in Jordan is now virtually free of all controls and restrictions and all direct subsidies have been removed. Credit to agriculture at low interest rates is now the single most important conduit for subsidies to agriculture.[78] As indicated in the Ministry of Environment's "2010 State of the Environment Report", the agriculture sector in Jordan is considered amongst the most important productive sectors as well as the biggest consumer of water.

Jordan imports about 60 per cent of the food consumed and approximately 20 per cent of local production is exported. Jordan's status as an importer of both food and fuel, along with the limited potential for food self sufficiency makes it particularly vulnerable to food price

shocks. With the global food crisis in 2008, the government made immediate attempts to alleviate the effects on the population of fast-rising commodity prices through various measures and set out to develop a national food security strategy.

B. Organic Farming as a Form of Sustainable Agriculture

Organic farming is the process of producing food naturally. This method excludes the use of synthetic chemical fertilisers and modified organisms to facilitate the growing of crops. The main idea behind organic farming is that it has no adverse effects on the environment.

The term "Organic" appeals to certain groups of consumers when it comes to selecting food products. In many developed countries such as the US and other European countries, certification is needed, in order to prevent the incorrect usage of the term "Organic".[79] Certification procedures help to ensure that the relevant standards regarding production and processing have been met, thereby also informing consumers and helping create markets for organic products.

Organic farmers believe the food produced in this manner is considered to:[80]

- Be of higher quality
- Have higher nutritional value as opposed to producing food by means of modern, industrial practices
- Contain no chemicals, drugs, artificial fertilizers or pesticides
- Contain no genetically engineered or altered substances or organisms
- Minimise soil erosion and decay
- Support the growth of a variety of crops

One of the benefits associated with organic agriculture in the case of Jordan is the opportunity to reduce water consumption, as organic farming uses less water than conventional farming, and replenishes the soil with vital nutrients. In addition, the reliance on natural pesticides allows a Jordanian organic farm to use wasps arriving at certain seasons during the year to eliminate other pests. This same farm performed a study, finding that the water in the underground aquifer beneath his farm could irrigate 400 dunums of land, but through the use of water saving techniques, the farm uses the same level of water for irrigating 2,500 dunums.[81]

In-spite of the growing world demand, organic farming has not really taken off in Jordan and has remained a niche product mainly due to a lack of appropriate policy incentives and institutional support, training on innovative agricultural practices and awareness.

C. Policies and Initiatives for Promoting Investment in Organic Farming

In order to promote organic farming, the Jordanian government has undertaken a variety of programs. For example, towards the end of 2006, the Jordan River Foundation obtained grants from the Spanish Agency for International Cooperation (in order to set up the legislative framework for Jordanian organic farming) and the Jordanian Ministry of Planning and International Cooperation (in order to encourage the growth of organic and medicinal plants and crops), valued at US $111,000 and US $500,000 respectively.[82]

The Jordan River Foundation has established three phases, for organic farming in Jordan:[83]

- Phase 1: Establishment of a legislative framework for organic farming

- Phase 2: Increase awareness and knowledge of organic farming, as well as developing workshops and examining already existing organic farming sites.
- Phase 3: Increase both the marketing and output of organic farms, and support organic farming in both the public sector and in NGO's.

One of the main obstacles to the promotion of organic agriculture in Jordan is the lack of an organisation that can independently assess whether the goods sold by farms are indeed organic. However, as of 2008, the Institute for Market-Ecology started offering official certification services, in Jordan. So far, over 30 farms have begun this process.[84] One key recommendation for the government is to streamline regulations regarding proper labelling.

The "National Programme for Organic Farming", an initiative of HM Queen Rania, aims to have 5 per cent of the nation's farms offer organic goods, by 2014. The King Abdullah II Fund for Development has offered compensation for the certification of various organic agricultural producers. It takes three years to complete the certification process.[85]

However, if organic farming is to be promoted to a larger scale in Jordan, an action plan is needed, possibly by reviewing the "Jordanian Agricultural Policy" to promote and encourage organic farming. In addition, the government could also offer tax exemptions.[86]

Another very useful initiative would be an "Organic Farming Cooperative", providing a direct link between agricultural producers, consumers and the public sector. The public sector could also assist in labelling and finding markets for organic goods, both within Jordan and in foreign markets. It is important to note that Jordanian farmers have been successful in growing jojoba and other draught resistant crops.

D. Organic Agriculture Investments and Job Creation

As a knowledge intensive activity, farming promotes the use of traditional knowledge, and increases inter-farmer cooperation.[87]As such, it represents a valuable "social capital" for society.

Approximately 3 per cent of Jordan labour force is employed in agriculture.[88] There is a basis for growing employment in organic agriculture. The government is aiming to have 5 per cent of farms offering organic goods by 2014, thus increasing the need for employed personnel. Jordan has a rapidly expanding population, expected to reach 7.1 million by 2020.[89] The expansion of organic farming could provide a significant opportunity to meet this demand, employing more individuals, instead of importing more food.

Within the agricultural sector there is an estimated total of JD 2.22 billion in investments, approximately 50 per cent of which are foreign. The total agricultural land used is 813.6 thousand dunums. Assuming a goal of 5 per cent of total agricultural land to be used as organic farmland, would lead to approximately JD 111 million in investments and 40.6 thousand dunums in total lands used. This will also lead to the creation of 1,700 jobs. Because green agriculture has more added value and requires higher skill workers than traditional agriculture, where 21.6 per cent of all workers are non-Jordanians, this could open up new job opportunities for local Jordanian workers.

4.6 SUSTAINABLE TOURISM

A. CURRENT TRENDS IN SUSTAINABLE TOURISM

In general, sustainable tourism development guidelines and management practices are applicable to all forms of tourism in all types of destinations, including mass tourism and the various niche tourism segments. Sustainability principles refer to the environmental, economic, and socio-cultural aspects of tourism development, and a suitable balance must be established between these three dimensions to guarantee its long-term sustainability. Thus, sustainable tourism should:

1. Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes, and helping to conserve natural heritage and biodiversity.
2. Respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance.
3. Ensure viable, long-term economic operations, providing socioeconomic benefits fairly distributed to all stakeholders, including stable employment, income-earning opportunities and social services to host communities, and contributing to poverty alleviation.

With an overall growth from 4.6 million in 2003 to 7.1 million tourists visiting Jordan in 2009, the Kingdom managed to sustain growth in its inbound market despite the current Global Economic Crisis. Between 2008 and 2009, the number of tourist visits declined by 0.2 per cent and was 7.1 million visitors in 2009. Just over half, or 53 per cent, were overnight tourists while the remaining were daily visitors.

The supply of lodging facilities has been responding to the increasing demand all round. There are a total of 486 classified and unclassified hotels in Jordan; with 45,176 total beds. Within Amman there are 318 hotels (27,260 rooms), 246 of which are classified. The highest number of nights spent were observed at 5-star hotels and in Amman, which reflects the status of visitors to Jordan who are typically high-income Arab and Gulf tourists.

Jordan has a wide variety of ancient ruins, natural wonders such as the Dead Sea, a favourable climate and hospitable people. Moreover, several sites in Jordan are inscribed with the UNESCO world heritage (and mixed) sites. Tourism can be a profitable industry. However, tourism – visiting tourists as well as the hotels, restaurants and other facilities catering to them – can contribute to environmental degradation. Environmentally sustainable tourism must ensure not only that tourists respect the environment (demand aspects), but that the needs of businesses and communities that cater to tourist needs are met (supply aspects). Therefore, sustainable tourism promotes a greater use of renewable energy, uses less water, makes less waste, protects bio-diversity and supports the area's cultural heritage.[90]

Tourism makes up roughly one tenth of the nation's GDP. It is the largest export segment and the second biggest private sector employer, with over 90,000 people employed in 2010.[91]

Some Eco tourism sites in Jordan

The Badia Area has many historical and ecological characteristics, making it an appealing eco-tourism site. The Badia Research and Development Center is attempting to market Badia as a sustainable tourism project.

The Badia Research and Development Center helped in transforming the Hamza oil field camp into its current incarnation as an eco-tourism destination and astronomy facility. The Global Environment Facility has offered funds to assist the camp. The camp, being far away from any urban area, is an ideal spot for astronomy. While being one of the few locations in Jordan where astronomy is possible, the camp is also run on renewable energy, and employs 60 individuals.

Jawa is one of the oldest historical cities in the nation, being built even before the Roman period. It encompasses 89 dunums and contains a sophisticated water delivery system. The Burqu Castle, found near the Harra basalt range, is a former Nabatean castle, having been used by different civilisations. It even shows signs of an early water delivery system, and a dam that works till today. Another ancient Nabatean castle is Aseikhim, built on a dormant volcano, surrounded by solidified lava. The castle covers 23.5 sqm, and there is also evidence that this structure survived various occupations.

Source: http://www.badia.gov.jo/ecotourism.html

Founded in 1987, the Ajloun Forest Reserve encompasses an area of 13 km^2. Its height above sea level ranges from 600 metres to 1,100 metres above the sea, and is primarily a Mediterranean type area, in terms of climate and vegetation found. This Reserve accounts for a large part of the nation's forest covered area. It was designated in 2000 as an "Important Bird Area", by Bird-Life International and the Royal Society for the Conservation of Nature. The Reserve has to contend with considerable challenges, namely in the form of excessive tree cutting or poaching and construction projects.[92]

The Ibn Hammad Valley, while a resort of considerable beauty, is facing threats from negligent and reckless tourist behaviour. The site, designated as a "Special Conservation Area", in Karak, contains a wide variety of plant and animal species, including the red fox and striped hyena. It also witnesses the migration of hundreds of storks, annually. Approximately 10,000 individuals live in the villages around the valley.

Due to the environmental threats facing the valley, along with the increased demand for tourism, the "Integrated Ecosystem Management, Jordan Rift Valley Project", was formed. Managed by the Royal Society for the Conservation of Nature, this six year initiative formulates instructions and principles for the various financial schemes assisting the Valley's environmental programmes.[93] Figure 7 shows the number of tourist arrivals to Jordan and the revenues generated from tourism.

FIGURE 7: TOURIST ARRIVALS AND REVENUE

Source: Ministry of Tourism and Antiquities

Nature reserves are few in Jordan and some have only recently been established, hence nature tourism is still nascent. Table 7 below provides a historical view (1998-2005) of the tourist arrivals in Jordan per reserve. Note the fluctuating pattern of arrivals over the period.

TABLE 7: ECO- TOURISTS IN THE RSNC RESERVES IN JORDAN

The Reserve*	1998	1999	2000	2001	2002	2003	2004	2005
Dana guest house	7859	9428	9687	5373	4280	2277	2222	3494
Rummana Campsite	6362	6401	7356	6602	6601	3127	6010	6655
Mujib	2137	3897	5304	875	1190	667	2189	4274
Shoumari	3541	4449	4799	5008	3486	2364	3998	4769
Azraq	-	-	3002	3316	2557	1526	3372	3062
Ajloun	-	-	-	-	-	-	1594	3548
Feynan	-	-	-	-	-	-	-	378
TOTAL	**19899**	**24175**	**30148**	**21174**	**18114**	**9961**	**19385**	**26180**

Source: RSCN, 2006

*Note that in addition to the above listed reserves, according to the Ministry of Tourism, Wadi Rum received 285566 visitors in 2010.

In Jordan, USAID, the Global Environmental Facility (GEF), and other donors have partnered with the Royal Society for the Conservation of Nature (a Jordanian NGO) to implement a community-based approach to achieve protected area management and poverty reduction in rural areas. Tourism services and nature-based craft enterprises have been established in the Dana Nature Reserve in southern Jordan, the Azraq Oasis in the Eastern Desert, and the Mujib Reserve next to the Dead Sea and Wadi Rum. More than 3,000 residents are receiving direct or indirect benefits. The initiative has also greatly assisted biodiversity conservation through the establishment and management of protected areas and enforcement of wildlife laws.

B. POLICIES AND INITIATIVES

One of the initiatives taking place, in order to ensure that tourism is handled in a sustainable manner, is the Dana Biosphere Reserve. Established over two decades ago, this is the nation's largest biological reserve, encompassing 320 km^2, and runs along the "Great Rift Valley", form the 1.5 km tall Quadesiyya Plateau to Wadi Araba. The Reserve contains over 800 different

plant species, three of which are unique to that reserve alone. The Reserve also contains many rare or endangered species of plants and animals; the world's largest breeding facility for "Syrian Serin" is in this Reserve. Within the Reserve, there are specific zones for grazing, recreation and other activities, each designed to ensure the highest possible safety of, and growth for, the habitat. There are still significant dangers to the environment in that area, including excessive grazing by farm animals, tree logging and the hunting of endangered species.[94]

Other reserves include the Ajloun Reserve, at 13 km^2, Mujib Nature Reserve, at 212 km^2, with over 300 species of plants and animals, Shaumari Life Reserve, at 22 km^2, with over 190 species of plants and animals, Dibeen Forest Reserve, at 8.5 km^2, habitat to 17 endangered species (including the Persian squirrel), Azraq Wetland Reserve (which attempts to re-introduce water into an area that has been drained by over-use), Wadi Rum Protected Area, encompassing 720 km^2, and the Yarmouk Protected Area.

Areas that are proposed to be classified as "protected areas" include the Yarmouk River, at 30 km^2, Fifa (located near the Dead Sea) at 27 km^2 and Jabal Mas'uda, at 460 km^2.[95] There are many organizations offering assistance to, and investing in, eco-tourism in Jordan, such as "Bird Life International", "World Conservation Union", one of the partners in the Jordan Rift Valley Project (an attempt to preserve the Jordan Rift Valley, while adapting to the increasing social and economic needs of those living in the area, and using its resources), the "International Fund for Animal Welfare", which has assisted RSCN in maintaining biodiversity in Jordan in a variety of ways, including the training of patrol officers, environmental police and the yearly "Animal Action Week", a public awareness campaign.

The RSCN has received funding from institutions including, but not limited to, USAID (for improving environmental journalism), UNDP, the World Bank (for an inventory of the various plants in Jordan, along with possible medical uses), Ministry of Planning, Hanns Seidel Foundation (for training), European Commission (for a pilot programme in Ajloun Forest for sustainable resource use) and the Dutch Embassy (for the Burqu Nature Reserve's community consultation). Private sector help came from such firms as Jordan Telecom (which offered monetary assistance for the RSCN's efforts in water preservation in the Mujib Nature Reserve) and the Jordan, US Business Partnership (which helped the RSCN improve its marketing and sales potential).[96]

Natural sites such as the Dead Sea are ideal for development as an ecotourism venture, and work is needed to integrate these concepts into new Master Plans for the area through the Dead Sea Development Commission.

C. Income Generation and Job Creation

Tourism utilises a variety of skills and supplies from various sectors and, if made sustainable, could influence the entire value chain (e.g. agriculture, utilities, handicrafts and transport.) Furthermore, the sector employs a greater number of women and new entrants into the workforce than many other industries.

Within the most prominent Jordanian example, the Dana reserve is bordered by the Dana village where villagers are encouraged to produce from local inputs to create pottery and jewellery, automatically generating income for themselves. There are currently a few hundred people living in the village purely on the expenditure generated from ecotourism.

Tourism in Tafileh is concentrated mainly in the Dana Nature Reserve. The number of visitors is expected to range from 24,000 – 30,000 annually, with 1,520 overnight visitors from January to July 2010. This compares to the 8,500 visitors to the rest of the Tafileh governorate in 2009. The average tourist spends JD 251 on the entire trip in Jordan.[97]

In general, tourism is one of the world's fastest employment generating industries, particularly for women, new job seekers and recent migrants. Globally, approximately 8 per cent of the workforce is to be found in tourism, and between 60 to 70 per cent of the global workforce is female; approximately half of those employed in tourism are younger than 25 years of age.

TABLE 8: TOURISM INDIRECT AND INDUCED EMPLOYMENT

Country	Total Employment Generated per 1 Employee in Tourism	Employment per 10,000 USD tourist expenditure
Jamaica	4.61	1.28
Mauritius	3.76	N/A
Bermuda	3.02	0.44
Gibraltar	2.62	N/A
Solomon Islands	2.58	N/A
Malta	1.99	1.59
Western Samoa	1.96	N/A
Republic of Palau	1.67	N/A
Fiji	N/A	0.79
Edinburgh (UK)	N/A	0.37

Source: Bertrand, N, and Cabrini, L. "Green Economy Report," Tourism Chapter, UNEP, Draft as of 6 December, 2010

Estimates have shown that for every 100 jobs generated in tourism, 69 are generated in another part of the economy. However, once indirect increases are factored in, then it can be said that 113 jobs are created for each 100 additional units of employment in tourism.[98]

It should be noted that the average tourist, globally, consumes between 25 to 284 megaJoules of electricity per night. Also, the amount of water the average tourist, globally, consumes ranges from 100 to 2,000 cubic litres per night (which is a considerable drain in a country such as Jordan, which is among the most water deprived countries in the world). Environmentally friendly tourism seeks to reduce the levels of water and electricity consumption found in traditional tourism to more acceptable levels.[99]

A recently published USAID study has shown that ecotourism has the potential to be not only a profitable enterprise, but also a method of preserving endangered plants and animals. This happens through increased awareness campaigns, funded in part by generated income.[100] The report goes on to say that eco-tourists spend money which directly translates to jobs and incomes for households. It also generates work for tour guides, lodges, restaurants and satellite activities such as crafts.

Assuming, as in the organic agriculture sector, that 5 per cent of all tourists come for sustainable tourism, that would translate into an additional expenditure of JD 89 million, which would create approximately 3,900 jobs based on past expenditure / employment ratios.

5 ENABLING CONDITIONS FOR A GREEN ECONOMY IN JORDAN

5.1 POLICIES, REGULATIONS AND INSTITUTIONAL STRENGTHENING

Jordan has adopted a number of innovative policies and regulations in certain areas to help transform key economic sectors and to enable a move towards a green economy. For example, the Renewable Energy Law contains provisions for a Renewable Energy & Energy Efficiency Fund, for the creation and maintenance of renewable energy infrastructure. The law also aims to minimise barriers to efficient energy use in the Jordanian market.[101] Such policies could be expanded to other sectors of particular importance, along with greater government spending that target the most prominent environmental challenges. For example, while air pollution is the greatest component of environmental degradation, government spending currently focuses on water wastewater treatment (40 per cent of the total spending on environment protection).

Jordan's environmental governance system can be further enhanced through greater policy coordination, monitoring, and enforcement. The Ministry of Environment at the national level and within its regional directorates would benefit from additional human capacity, in particular area specialists including economists, in order to enhance its capacity for environment and economy-related assessments and the generation data and management. The Environmental Protection Fund offers financial support in terms of grants and loans to environmental entrepreneurs and companies seeking to invest in sustainable environment projects. In addition, CBO's and NGO's can play a greater role in information dissemination, feedback and monitoring. Furthermore, the efforts to combine standards with market mechanisms have been modest, although the Ministry of Environment has a dedicated Inspection Directorate and the presence of dedicated Environmental Rangers. Regulatory approaches combined with market-based instruments could contribute to better policy effectiveness.

5.2 FISCAL REFORMS

The Jordanian government has long subsidised both fuel and water which encouraged inefficient use of these resources. The decrease in fuel subsidies from JD 214 million in 2006 to JD 22 million in 2010, before such subsidies were eventually reinstalled, proved that price signals can alter consumer behaviour provided that green or sustainable alternatives are available. There may be a need to consider more targeted subsidies for other important and scarce resources such as water, and ways of sustaining such policy reforms over time. Currently, water subsidies for households are approximately 48 per cent of the total water bill and varies based on the level of consumption. Industry, commerce and agriculture are priced at different rates. Total subsidies for food were JD 75 million in 2010. Incentives for the development and deployment of clean technologies such as renewable energies, and the promotion of low-input, more sustainable forms of agriculture could play a critical role in greening those essential economic sectors. More analytical work could further inform government policy in these areas.

5.3 FINANCING SCHEMES

Public spending on the environment is less than 0.5 per cent of the government budget. Investment requirements estimated for the six sectors examined in this report are significant and will demand the mobilisation of greater amounts of public and private financial resources (see Table 9). Currently, most funding for environmental initiatives benefits from aid from donor countries and organizations. However, there are encouraging signs that new funding – from the Jordan Renewable Energy Fund to the Green Investment Fund and the Environmental Protection Fund – are forthcoming and can play a major role in financing the transition to a green economy.

6 CONCLUSION

6.1 GREEN JOBS AND INCREASED INVESTMENT

The findings of the report are summarised in the table below (please see each sector analysis above for details on calculation methods):

TABLE 9: JOBS AND INVESTMENT GENERATED PER SECTOR IN JORDAN

Sector	Green Jobs Created	Investments (JD million)	Time Period
Renewable Energy	3,000	620	2010- 2020
Transport	9,500	130	2010- 2020
Water	31,000	330	
Waste Management	3,000	41	
Organic Agriculture	1,700	111	2010-2014
Sustainable Tourism	3,900	89	Annually
Total	**51,100**	**1,321**	--

Based on this table, greening the economy in Jordan could result in created 51100 new jobs and stimulating about JD 1.321 billion in new investment in ten years. In addition, this could catalyse significant development aid in order the support growth in jobs and income, while ensuring long term sustainability.

6.2 INTEGRATED APPROACH

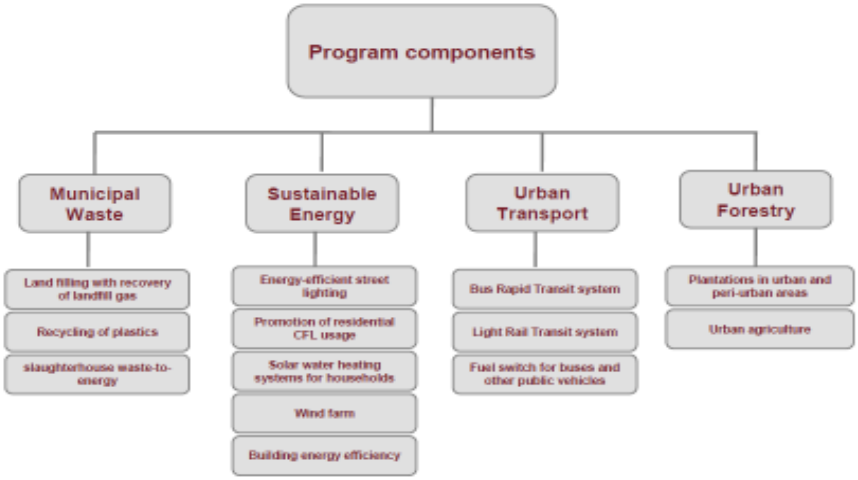
A transition towards a green economy entails the systematic scrutiny of patterns of production, particularly: the production of toxic components, such as lead in gasoline, or poisonous waste including radioactive chemicals; the development and deployment of cleaner and renewable sources of energy to reduce the impact of global climate change; greater reliance on public transportation systems in order to reduce vehicle emissions; congestion in cities and the health problems caused by polluted air and smog; and, the growing scarcity of water.

The Amman Green Growth Programme (AGGP) is a good example of the green economy integrated approach. It focuses on: sustainability through land use policy; encouraging compact urban growth; increasing transit use; promoting mixed land use; improving public transit and pedestrian movement; protecting and conserving agricultural lands; creating a "Natural Heritage System"; and, conserving the "Cultural Heritage" of Amman. More specifically, the programme aims at:

(i) Improving the urban environment while contributing to the climate agenda
(ii) Improving the cost efficiency of municipal services
(iii) Mobilising additional sources of revenues through carbon markets

The programme will reduce GHG emissions at the city level, aggregating carbon emissions from waste, energy, transport and forestry sectors, using an under–development city wide approach that combines approved methodologies. The AGGP, with a total investment of US $2.825 billion over 28 years, will cover four sectors: Municipal Waste, Transport, Energy, and Urban forestry. It is estimated that emission reductions will exceed 0.56 million tCO^2 emissions per year. Figure 8 below shows the programme components and different strategies under each component.

FIGURE 8 : THE AMMAN GREEN GROWTH PROGRAMME (AGGP)



Source: Amman Green Growth Programme

The AGGP city-wide approach to emissions reductions and to the promotion of low-carbon investments that will sustain economic growth in the city of Amman could be used as a blueprint for the development of a national, cross-sector green economy approach.

In addition, the environment and the economy cannot be thought of in isolation of development and combating poverty. In order to achieve sustainable development, environmental protection should constitute an integral part of the development process. Furthermore, eradicating poverty must be at the heart of the green economy and is an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world, Jordan not being the exception.

6.3 Inter-Ministerial Coordination

The Prime Ministry traditionally has an Economic Committee comprised of 15 ministers, headed by the Deputy Prime Minister. A sub-committee on sustainable development and the green economy could be created as a platform for inter-ministerial dialogue and policy framing to advance a green economy transition. Such a committee could be facilitated by the Minister of Environment and comprise, among others, Planning, Finance, Industry, Agriculture, Energy, Water, and Tourism ministries. The private sector should also be able to engage in the committee through its representatives in the Chamber of Industry and Commerce, or through other unions and associations.

6.4 Building on the Findings of the GESS

The social and political turmoil in the Middle East and North Africa have given renewed urgency to the need to counter chronic unemployment, particularly among young people in Jordan. A process of green economic transformation that creates jobs for young people should be supported by facilitating the operations of local and international private entrepreneurs, especially in infrastructure sectors and in the deployment of clean technologies. A 2009 IMF study conducted in Jordan and five other Arab countries (Egypt, Tunisia, Lebanon, Morocco and Syria) showed that the share of young people among the unemployed in the six countries exceeds on average 40 per cent. Surprisingly, unemployment in this region tends to increase with higher levels of education and exceeds 15 per cent for those with tertiary education in Egypt, Jordan, and Tunisia. According to the IMF, governments can implement a number of

immediate measures to step up job creation and enhance the employability of their young populations:

- By bringing forward viable labour-intensive infrastructure projects that are already in the pipeline. Evidence from Latin America and the Caribbean suggests that infrastructure investment can have a sizable impact on employment generation—about 40,000 direct and indirect new jobs can be created in the short term for every US $1 billion spent on infrastructure projects.

- By providing tax incentives or credit guarantees to labour-intensive small and medium-sized enterprises, as implemented in many emerging markets and transition economies during the global financial crisis. By improving the business climate, equipping young people with proper skills, and providing incentives for small- and medium-sized enterprises in urban and rural areas is particularly promising.

Beyond job creation, food security and poverty alleviation can be addressed by improving trade agreements, logistics, and infrastructure, as well as through support for sustainable farming and organic agriculture. Effective social safety nets—including targeted food subsidies for the poorest, labour-intensive public works programmes, conditional cash transfers and in-kind transfers (such as food aid or school feeding programmes), and unemployment insurance—are essential for protecting those at risk from food insecurity. Improving basic social services and infrastructure, especially education opportunities and health care for women, fosters food security and transformation more effectively, rapidly, and broadly.

These elements could form part of a capacity building programme and inform the development of blueprint for a green economy in Jordan. Domestic budgetary resources and donor funds will be required to take forward the key findings of this scoping study in order to enable public policy makers in Jordan to integrate them into development strategies, plans and policies.

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