JOHANNESBURG SUMMIT 2002

JORDAN

COUNTRY PROFILE

UNITED NATIONS

INTRODUCTION - 2002 COUNTRY PROFILES SERIES

Agenda 21, adopted at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, underscored the important role that States play in the implementation of the Agenda at the national level. It recommended that States consider preparing national reports and communicating the information therein to the Commission on Sustainable Development (CSD) including, activities they undertake to implement Agenda 21, the obstacles and challenges they confront, and other environment and development issues they find relevant.

As a result, in 1993 governments began preparing national reports for submission to the CSD. After two years of following this practice, the CSD decided that a summarized version of national reports submitted thus far would be useful. Subsequently, the CSD Secretariat published the first Country Profiles series in 1997 on the occasion of the five-year review of the Earth Summit (Rio + 5). The series summarized, on a country-by-country basis, all the national reports submitted between 1994 and 1996. Each Profile covered the status of all Agenda 21 chapters.

The purpose of Country Profiles is to:

- Help countries monitor their own progress;
- Share experiences and information with others; and,
- Serve as institutional memory to track and record national actions undertaken to implement Agenda 21.

A second series of Country Profiles is being published on the occasion of the World Summit on Sustainable Development being held in Johannesburg from August 26 to September 4, 2002. Each profile covers all 40 chapters of Agenda 21, as well as those issues that have been separately addressed by the CSD since 1997, including trade, energy, transport, sustainable tourism and industry.

The 2002 Country Profiles series provides the most comprehensive overview to date of the status of implementation of Agenda 21 at the national level. Each Country Profile is based on information updated from that contained in the national reports submitted annually by governments.

Preparing national reports is often a challenging exercise. It can also be a productive and rewarding one in terms of taking stock of what has been achieved and by increasing communication, coordination and cooperation among a range of national agencies, institutions and groups. Hopefully, the information contained in this series of Country Profiles will serve as a useful tool for learning from the experience and knowledge gained by each country in its pursuit of sustainable development.

NOTE TO READERS

The 2002 Country Profiles Series provides information on the implementation of Agenda 21 on a country-by-country and chapter-by-chapter basis (with the exception of. chapters 1 and 23, which are preambles). Since Rio 1992, the Commission on Sustainable Development has specifically addressed other topics not included as separate chapters in Agenda 21. These issues of trade, industry, energy, transport and sustainable tourism are, therefore, treated as distinct sections in the Country Profiles. In instances where several Agenda 21 chapters are closely related, for example, chapters 20 to 22 which cover environmentally sound management of hazardous, solid and radioactive wastes, and chapters 24 to 32 which refer to strengthening of major groups, the information appears under a single heading in the Country Profile Series. Lastly, chapters 16 and 34, which deal with environmentally sound management of biotechnology, and transfer of environmentally sound technology, cooperation, capacity-building respectively, are presented together under one heading in those Country Profiles where information is relatively scarce.

At the release of this publication, Jordan had not submitted its Country Profile in the standard format requested by the Secretariat. Therefore, this Country Profile is only available in the PDF format.

Contents

Message by HRH Princess Basma

Jordan, as many other countries, faces substantial environmental challenges. These challenges are aggravated by the scarcity of water supply, deterioration of water resources, land contamination, desertification, mismanagement of land use and air pollution. However, for the time being, these problems are relatively manageable; growing demand is still under control and limited resources have generally been dealt with efficiently. Jordan Agenda 21 offers us a more comprehensive and sustainable approach to dealing with such problems to ensure that our developmental gains are enjoyed not only by the present generation but also by future generations. For unless we strike a balance between the supply and demand of our limited resources, sustainable development will be unachievable and these considerations will create a burden rather than support and assist the national economy.

Jordan Agenda 21 has come at the right time. Environmental problems have been identified and analysed scientifically, means to solve, or at least, to alleviate them have been presented professionally, achievable projects and proposals covering most elements of resources have been highlighted. In parallel, the Agenda has come up with specific recommendations and legislative reforms leading not only to environmental preservation and protection, but also ent pledged at the Earth Summit in Rio de Janeiro in 1992. However, problems and issues of environment, regardless of their scope and nature cannot by any means, be dealt with solely at the national level, they require regional and sometimes international cooperation and interventions.

It gives me great pleasure to note that the preparation of Jordan Agenda 21 has come as a result of the joint efforts of a large number of Jordanian planners, decision makers, NGOs, environmentalists, as well as social workers and visionaries. It is through such partnerships that Jordan will be able to address its current and future challenges. It is also very encouraging to see that Jordan Agenda 21 calls for the participation of local communities in preparing their own local-level agendas, and that the monitoring systems identified, call for the involvement of all stakeholders. These partnerships are key to promoting and realizing the vision of the Hashemite leadership and all citizens, of a prosperous Jordan that is ever-proud of its most precious asset, the Jordanian people.

Princess Basma Bint Talal

Forward by HE Mr. Abdulrahim Al-Akour

On the dawn of this third millennium, Jordan faces various environmental challenges due to its fragile environmental resources and limited financial assets.

Despite the obstacles faced, we in Jordan have faith in our wise leadership and in the young generation the real asset in Jordan, characterized by their ability to give without weariness or tedium. We also believe in the capabilities of all citizens and their willingness to develop and grow. For that, we are confident of our capabilities to develop a comprehensive perspective for the future that would enable us to pursue higher levels of development.

Environmental issues ranging from less demanding problems to highly complex issues, namely poverty were always a global concern since the Stockholm Conference in 1972. The Earth Summit, which was held in Rio de Janeiro in 1992, was a clear indication of the continuous global and international efforts (over a period of twenty years) to promote environmental protection. During the summit, the urgency to focus on linkages between environmental and developmental issues was made evident. The participation of the late

The preparation of National Agenda 21 was the main outcome of the Earth Summit, outlining the approaches to be adopted by the international community towards achieving sustainable development.

Jordan pledged its commitment to the principles of sustainable development, and accordingly Agenda 21 has been prepared with extensive efforts and through a participatory approach involving all sectors of the society. This document set in motion a process of coordination, cooperation and harmonization between governmental and non-governmental institutions.

I hereby would like to extend my appreciation to all the parties who contributed, directly or indirectly, to the formulation of Agenda 21. I would like to reiterate the importance of Agenda 21 document, which reflects our commitment to our identity, culture, history and faith in our people.

As Jordanians, our unwavering dedication to place our country on the path of progress and development, requires that we all work to conserve our cultural heritage and unique biodiversity and that we cooperate with all governmental entities entrusted with protecting the environment. The quote from the Holy Quran serves as a meaningful guidance and inspiration for building a Jordan that is prepared to embrace the challenges of the new millenium.

Abdulrahim Al-Akour
Minister of Municipalities, Rural Affairs and the Environment
Chairman of the Higher Council for Environment Protection

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Institutions

Friends of the Environment, General Corporation for Environment Protection, Housing Corporation, Her Royal Highness Princess Basma Center, Jordan Institute of Public Administration, Jordan National Committee on Women, Higher Council for Environment Protection, Ministry of Municipal, Rural Affairs, and Environment, Ministry of Natural Resources and Energy, Ministry of Agriculture, Ministry of Health, Ministry of Tourism and Antiquities, Ministry of Water and Irrigation, National Information Center, Natural Resources Authority, Royal Society for the Conservation of Nature, Royal Scientific Society, University of Jordan, Ministry of Education, Aqaba Regional Authority, Ministry of Planning, and Jordan Environment Society.

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Abbreviations

ALECSO	Arab League Educational, Cultural and Scientific Organization
ARA	Aqaba Region Authority
CERM	Cultural and Environmental Resources Management
CIDA	Canadian International Development agency
CRM	Cultural Resources Management
DOA	Department of Antiquities
EC	European Community
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIS	Environmental Impact Statement
FAO	Food and Agriculture Organization
FOA	Friends of Archaeology Society
FOE	Friends of the Environment Society
GCEP	General Corporation for Environment Protection
HCST	Higher Council for Environment Protection
ICCROM	International Centre for the Study of the Preservation and the Restoration of Cultural Property, Rome
ICOM	International Council of Museums
ICOMOS	International Council on Monuments and Sites
IUCN	International Union for the Conservation of Nature
JADIS	The Jordan Antiquities Database and Information System
JES	Jordan Environment Society
JICA	Japan International Cooperation Agency
JIPA	Jordan Institute of Public Administration
JVA	Jordan Valley Authority
KDC	Karak Development Corporation
METAP	Mediterranean Environmental Technical Assistance Program
MMRAE	Ministry of Municipal and Rural Affairs and the Environment
MNRE	Ministry of Natural Resources and Energy
MOA	Ministry of agriculture
MOC	Ministry of Culture
MOH	Ministry of Health
MOP	Ministry of Planning
MOTA	Ministry of Tourism and Antiquities
MOWRA	Ministry of Awqaf and Religious Affairs
MW	Megawatts
MPWH	Ministry of Public Works and Housing
MWI	Ministry of Water and Irrigation
NEAP	National Environment Action Plan
NES	National Environment Strategy
NGO	Non-Governmental Organization
NIC	National Information Center
NRA	Natural Resources Authority
PNT	Petra National Trust
PPU	Project Preparation Unit

PRC	Petra Region Planning Council
RSCN	Royal Society for the Conservation of Nature
S.D	Sustainable Development
RSS	Royal Scientific Society
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UJ	University of Jordan
USAID	United States Agency for International Development
WAJ	Water Authority of Jordan
WB	World Bank

Executive Summary

Executive Summary

INTRODUCTION:

NATIONAL CHALLENGE, GLOBAL COMMITMENT: Jordan is highly dependent on its fragile environment. Ensuring that environmental resources water, soil, plants and so on - are used in a sustainable manner is one of our most urgent commitment to the principles of sustainable development was confirmed at the Earth Summit in Rio de Janeiro in 1992. An action-oriented national agenda for sustainable development in the coming century - 21 - has been prepared over the past three years.

National effort needed: Achieving Agenda-21 will require a concerted national effort involving new political, social and economic partnerships. Firm commitments will be needed to ensure the necessary capacity-building, information, improved institutional and legal arrangements, technology and money. Integration of environmental and socio-economic development concerns will need to be reflected in new attitudes, changes to decision making processes and improved systems for planning, implementing and monitoring all major initiatives in the country.

Building national capacity: To make the transition to more sustainable development, Jordan will need to build its domestic capacity for addressing a wide range of sustainable development challenges described in detail in the national agenda. Capacity building for sustainable development will need to integrate Jordan's indigenous knowledge and cultural heritage with modern knowledge and technology. Our ability to move towards a sustainable society will be determined to a large extent by our national capacities to make independent, equitable and well informed decisions. These decisions need to reflect our real environmental potentials and limits on the one hand, and the needs and aspirations of the Jordanian people on the other hand.

Participatory process: Agenda 21 was developed through an extensive participatory process that forged national consensus while building national capacities and strengthening the sense of ownership development agenda. The document was drafted by fifty Jordanian public and private sector specialists from many fields.

The work of all these national experts has been integrated into a single document organised into three sections. The first section (chapters 1 3) reviews the key sustainable development challenges facing Jordan and the best ways to meet these challenges. Issues are analysed, national objectives proposed and the concrete actions needed to meet the objectives are defined. Much of the second section (chapters 4 7) follows the same format, discussing critical cross-sectoral challenges and instruments

available for facing these in coming years. The third section (chapters 8 11) looks at how to implement the agenda. Additional, related work, much of it done by the same Jordanian experts, is annexed to the national agenda. A complementary document contains the detailed baseline reports prepared by all the working groups.

The longer term value of the Agenda 21 process: The Agenda 21 document itself is not the only

Agenda 21 process. The experience gained in formulating the national Agenda 21 will also prove valuable when developing the tools needed to implement the many activities called for in the agenda.

The necessary follow-up: A sustained, concerted effort is needed to ensure effective implementation

Agenda 21 committee, representing government, NGO and private sector interests in many sectors will need to periodically review progress towards the goals of the agenda, and review these goals from time to time to ensure they remain relevant to ving circumstances.

CHAPTER 1 INTEGRATED RESOURCE MANAGEMENT:

The first chapter of the national Agenda 21 looks at sustainable development questions related to the integrated management of the

energy and mineral resources.

WATER RESOURCE MANAGEMENT is clearly the most important resource management issue in Jordan. This section of the Agenda examines a wide range of interrelated issues: integrated management of water resources, water resource assessment, protection and management of potable water supplies, water quality and aquatic ecosystems, sanitation, and integrated water management for sustainable urban development and for sustainable food production and rural development. It also looks at the probable impacts of climate change on water resources in Jordan. Finally, it considers issues associated with the institutional and financial structure of water management in Jordan.

Most of Jordan is either arid or semi-arid. Most water for municipal water supply and industry currently comes from groundwater and springs.

Integrated water resource management is a prerequisite for the development of all socio-economic sectors. The future of irrigated agriculture in Jordan, for example, is severely constrained by water scarcity. With current trends and policies unchanged, Jordan non-renewable groundwater reserves will be exhausted in 50 years.

Water resources assessment and monitoring are key issues for water resource development, management and planning. Planning and policy formulation for the utilisation of water resources must be based on reliable assessment of these resources. A monitoring network for surface and groundwater resources is operating currently but suffers from malfunctions and / or errors in data collection and processing.

Deterioration of both surface and groundwater resources is a major

concern in Jordan. It is due mainly to increased industrial activity, over-exploitation and population growth.
Water demand in Jordan exceeds available renewable supply. As a result, groundwater levels are declining and water quality is deteriorating. The efficiency of delivery of both irrigation and urban water supply is very low.

Water demand management may prove less expensive, more sustainable and easier to implement than supply expansion. The surface water forms 65% of the total available water resources. For this reason, the surface water should be managed carefully to support the groundwater resources, which are being exhausted.

A high percentage of Jord population lives in urban centres where many key environmental problems are related to water, such as waste water disposal, watershed protection and control of industrial water pollution.

Water for agriculture: Population growth, improved living standards, urbanisation and industrialisation have all contributed to great increases in water demand by sectors other than agriculture. Agriculture today suffers from acute water scarcity. Decreased water availability for agriculture makes it essential to ensure efficient management of irrigation water, the adoption of new water-saving technologies and the improvement of rain-fed agriculture.

Global warming scenarios for the next 50 years foresee a rise in global temperatures that would result in a decrease in rainfall in Jordan, with disastrous impacts on water resources and agriculture. Jordan will need to develop new policies or adopt existing policies of social and economic development that take into account the potential impact of climate change.

Fresh water supplies in Jordan are mostly conventional groundwater resources. These are limited and in many cases over-committed. There is growing demand for fresh water in all sectors and this will widen the gap between demand and supply. Developing new fresh water resources is too expensive for sectors such as agriculture. Some fresh water reserves decline in quality when groundwater is overexploited, leading to intrusion of salt water, or when reclaimed wastewater is mixed with surface water. The most important conventional fresh water resources, including the Disi Aquifer in the south and Yarmouk River in the north, are shared with neighbouring countries. No agreements govern the use of this water.

Institutional arrangements in the water sector are unable to meet the challenges facing Jordan. Institutional restructuring is essential for better water resources management.

Public and private sectors both need to recognise water as an economic commodity, rather than a social entitlement, and to begin charging prices reflecting the full costs of water use. Cost recovery will require efficient services for metering and billing.

LAND RESOURCE MANAGEMENT is another key sustainable development issue for Jordan. This section in the national

Agenda 21 considers issues of agricultural and range land management, preventing land degradation and desertification, forest management, urban planning and related legislative and institutional issues.

Expanding human activities place resources and create a host of environmental problems. Land use in Jordan is unbalanced and suffers from conflicts among the major land uses. Integrated land use planning, supported by appropriate legislation, is needed to balance the demands of multiple users.

Agricultural land: agricultural potential is limited. Rain-fed agricultural is limited by scarce, irregular rainfall in most areas and by steep slopes in areas of

range lands are unable to economically produce feed for fattening and milk production. Overgrazing, a succession of droughts and the appropriation of the better lands for rain-fed crops have decreased fodder availability without a decrease in livestock numbers.

Scarce surface and ground water resources constrict the expansion of irrigated agriculture. Potentially irrigable lands are largely confined to the Jordan Valley. Agricultural land is also characterised by the preponderance of small size farming units over 40% of holdings are between 0 and 2 hectares, while almost 70% are less than 5 hectares.

Severe limitations of agricultural land are aggravated by the loss of the best agricultural land to urbanisation and industrial uses. Land available for agriculture is further reduced by the fallow system and by land speculation. Most of the Badia have traditional rights to communal land, which impose constraints on its development.

Range lands cover over 90% of Jordan and most are presently in poor to very poor condition. They urgently need demarcation, re-organisation, management plans and action programmes. In most cases, current production is between a third and a sixth of its real potential. The main cause of this low productivity is overgrazing. Another factor has been cereal cultivation on marginal lands. Uprooting of shrubs and other plants for firewood deprives range-lands of their natural protection, further intensifying wind and water erosion.

Natural forests cover less than one area. These areas are fragmented and mostly unmapped. Most are degraded with little natural regeneration. All forests, including re-planted areas, cover less than one percent of the country. Large areas of these forests are threatened by pests, misuse and pressure from illegal cutting. Another one percent in hilly, stony areas without any actual forest cover.

from erosion and stabilise watersheds and other fragile areas, helping preserve the integrity of agricultural land. Forests can also improve local climate and water regimes, crucial for agriculture. recreation and tourism - more than two millions residents visit them every year.

A national forest monitoring plan is essential to forest management and sustainable forest utilisation.

needs improvement. Despite some gains, many problems remain, including illegal grazing and cutting, fires and ownership questions.

Land degradation: Arid and semi-arid lands, such as found in most parts of Jordan, tend to support relatively fragile ecosystems. Human interference can easily result in land degradation, such as salinisation of irrigated soils. Over half of rain-fed agriculture takes place on lands that are subject to accelerated soil erosion. Much semi-arid range land has been converted to unsustainable forms of agriculture.

Contamination of land in Jordan results from pollution by plastic waste, agricultural pesticides and herbicides, salinisation of irrigated soil and contamination from wastewater, especially in the Zarqa Basin.

Mining also causes loss of agricultural land: Most phosphate and potash production takes place in remote areas, while cement and other quarrying activities affect populated centres.

Urban land planning: Urban environmental problems are increasing in Jordan. Industries concentrate near urban areas, especially Amman, Zarqa and Aqaba. Negative interactions between industries and urban centres occur due to poor urban planning. Lack of mass transit contributes to air pollution from vehicular emissions, especially in Amman.

Legal and institutional: Existing planning laws, building regulations and permits require major revisions. Overlapping institutional responsibilities for land management lead to policy conflicts. Lack of comprehensive land use legislation contributes to land degradation, loss of agricultural lands and bio-diversity. Well-trained specialists are in short supply.

AGRICULTURAL RESOURCES:

This section looks at the need for improvements in agricultural productivity, in the management of irrigation water and in the technology for sustainable agriculture. It also considers issues related to rural development and the agricultural labour force.

Agricultural productivity: Agriculture must keep up with

Agricultural inputs have to be intensified to compensate for limited arable land and to avoid expansion into fragile marginal lands. Yet intensifying inputs creates environmental risks. There is an urgent need to maximise yields while minimising risks.

Managing irrigation water: agriculture suffers from scarcity of water that will be aggravated by the increasing water demands of different sectors in coming years. Available aquifers are shared with neighbouring countries and no common agreements have been reached to ensure their rational use and protection. Options include constructing new dams and reservoirs, re-using treated wastewater, changing crop patterns, introducing drought-resistant crops, improving efficiencies of irrigation

systems and desalinating sea water. Improved irrigation management can be achieved by better protection of water from contamination by agro-chemicals and industrial wastes, by a monitoring system and by public awareness programmes.

Sustainable agricultural technology:

hampered by a shortage of researchers and the lack of a coherent strategy. The National Centre for Agricultural Research and Technology Transfer suffers from inadequate resources and facilities. It focuses on isolated problems, rather than production systems. Sustainable agricultural technology needs to combine high productivity with high quality, making optimum use of scarce resources.

Rural development and labour:

labourers are non-Jordanians sending remittances abroad. More Jordanians need to be involved in the sector. At the same time, social security benefits, socio-economic and education programmes need to be extended to agricultural workers. Rural centres continue to suffer from loss of population through migration to urban areas. There is a need to improve rural living conditions and increase rural economic options, such as cottage food industries and off-farm income generating activities.

ENERGY RESOURCES: This

coherent energy policies, improved energy conservation and management, careful assessment of options for using oil shale and further development and exploration of conventional oil and gas resources. Finally it considers needs to investigate and promote new, renewable and alternative energy sources.

Energy issues pose a complex set of challenges for Jordan. Socio-economic development needs large amounts of energy. Jordan currently imports most of its commercial energy in the form of oil and this is a burden on the national economy. Large investments are needed to develop national energy supply options. Sustainable development in the energy sector can be achieved with a long-term strategy that strengthens energy planning and management and integrates them effectively with the relevant economic and development policies.

Formulating coherent policies: The national economy is closely linked with the energy sector, which contributes greatly to national development and economic growth. The needs of socio-economic development and environmental protection require carefully integrated energy, environmental and economic policy, planning and management. For example, Jordan has recently formulated a growth-oriented economic adjustment strategy integrating environmental concerns. The strategy focuses on achieving real progress in industrial and agricultural development through the optimal utilisation of scarce resources. It sets out the Government's expectations and targets for the energy sector, along with other sectors of the economy. The strategy calls for strengthening planning, management and technical skills in the energy sector.

Improving energy conservation and management are key elements of

bill. There is a need to improve energy conservation and optimise energy use because most economic growth in Jordan to date has been

aims to reduce the economic burden of imported energy and reduce the need for new investments, while alleviating environmental impacts of energy production and consumption.

Utilising oil shale: Jordan has oil shale reserves of more than 40 billion tons with an average oil content of about 10%. The exploitation of this oil shale is technically viable, but its economic feasibility depends on higher oil prices. If utilised, oil shale could

requirements for over a century.

Developing conventional oil and gas: Jordan depends almost entirely on imported oil to meet its energy needs. Domestic oil and gas reserves represent only about 1% and 4% respectively of imported quantities.

Promoting new and renewable energy: Jordan has an abundance of renewable energy resources, such as solar and wind. Small hydro, bio-gas and geothermal are also viable options. Renewable energy currently accounts for only 2% of energy use, mostly solar water heaters. Other applications include a solar pond, two wind farms for electric power generation, water pumping by windmill and photo voltaic cells for rural electrification.

Alternative energy resources: Other possible energy alternatives for Jordan include the tar sands near the Dead Sea, hydro-electric dams, geothermal energy and bio-mass.

MINERAL RESOURCES: Mining has been taking place in Jordan since antiquity. Since 1965 the Natural Resources Authority has been entrusted with responsibility for defining mining policies and plans and carrying out exploration for mineral resources and industrial rock in Jordan, in co-operation with other concerned authorities. Based on their work, many industrial rocks are mined today to supply the national and export markets. A number of industries such as ceramics, cement, fertilisers, glass and brick making have developed using locally available minerals.

Factors hindering the development

insufficient government funding for necessary studies and a lack of pilot plants and research centres.

The section concludes with evaluations of the potential for new development or further development of a range of metallic and non-metallic mineral resources found in Jordan.

CHAPTER 2 INTEGRATED ENVIRONMENTAL MANAGEMENT: The second

effective, integrated environmental management. This is needed to protect water and air quality, to ensure sound management of wastewater, solid waste and hazardous wastes, to properly manage sensitive coastal zones and to ensure effective protection of public health.

PROTECTING WATER QUALITY*:* Integrated

management and protection of water quality is one of Jor sustainable development priorities. This section looks first at institutional, regulatory and standards issues, then at monitoring and data management, technological research and development and, finally, at needs for public awareness and education.

Water is a scarce commodity in Jordan. Each citizen is currently allocated 156 litres per day - one of the lowest in the Middle East and in the world. Water demand will outstrip exploitable resources by the year 2000. Water scarcity is a function not only of available quantities but also of the quality of this water. Scarcity is exacerbated by population growth, estimated at 3.5% per year. Population growth increases pressure on already limited freshwater resources, and generates greater waste, threatening water quality. Water management must focus on protecting and managing both water quantity and quality.

Trans-boundary water management issues are important because much of the water currently available to Jordan is shared with neighbouring countries. The quality of this water

behaviour. It needs protection and monitoring.

Institutions, regulations and standards:
and effluent standards are based on guidelines from the World Health Organisation, the Food and Agriculture Organisation of the United Nations and other international standards, including some from Europe and the U.S. This approach was perhaps inevitable in the short-term, but is inappropriate for the longer term. Jordan needs national standards adapted to local conditions

wastewater treatment plants were meeting their design performance standards by the late 1990s. Upgrading the effluent of the other ten plants is necessary to protect surface and groundwater resources.

Monitoring and data management: Several government and quasi-government departments carry out water quality monitoring in Jordan. Poor co-ordination among them reduces the efficiency of national testing capacities, duplicates efforts and dilutes responsibility.

Research and development: Little original applied research has focused

Several possible research programmes need to be carried out as national initiatives. Jordan needs to encourage and strengthen local research on quality issues such as salinity, local water quality standards for various users and epidemiological studies.

Public awareness and education

problems are insufficient, given the gravity of these issues. Complacency among the public and poor communications between planners and users contribute to this problem. Water conservation awareness campaigns have been launched in recent years, urging the public to use less water. Similar campaigns need to target government agencies, the private sector, academics, religious groups and the public media. These campaigns should talk about the consequences of declining water

quality, the need to protect freshwater from pollution and the need to avoid using high quality water in tasks where lower quality water can be used (e.g., industrial cooling, irrigation).

WASTEWATER MANAGEMENT:

This section considers wastewater

municipalities and industries.

Municipal wastewater management in Jordan needs to be improved by extending sewage services, promoting integrated wastewater management, maximising environmentally sound approaches to wastewater re-use and recycling and promoting environmentally sound wastewater disposal and treatment.

Environmental health problems associated with human liquid wastes have changed over the years. With rapid growth of urban centres, traditional methods of on-site disposal become unsuitable, in part due to their impacts on local ground water aquifers.

A cholera epidemic in 1980 heightened awareness of the risks involved in uncontrolled re-use of wastewater but also of the potential for using properly treated wastewater

sewage systems were introduced into in cities, where treatment plants replaced traditional cess pits. By 1997, sixteen municipal sewage treatment plants were treating about 70% of total wastewater. Despite these achievements, a number of issues remain to be tackled. 25% of olds (housing 50% of the population) remain unserviced. Systems in Greater Amman and elsewhere still need to reach unserviced urban centres, urban fringes and slums. Over 10% of households, mostly in rural areas, are without any type of sanitation. Many cases of water and food pollution occur every year, often caused by intrusion of sewage into water systems. Finally, raw sewage entering treatment plants is often highly concentrated, imposing operational problems and problems in re-use and disposal.

Integrated wastewater management: A high level of wastewater collection, treatment and re-use has been achieved in recent years . Yet some crucial issues remain unresolved, including the need for a national wastewater strategy with comprehensive goals and policies. The institutional structure lacks clear lines of authority and responsibilities and suffers from weak co-ordination and integration. Personnel management suffers from poor job descriptions, lack of incentives and training activities. The operation and maintenance of the wastewater collection system suffers from breakdowns. Failure to respond to these breakdowns effectively creates hazards and public health risks.

Recycling and reusing waste water: Re-use of wastewater is necessary because available water supplies

Over 80% of wastewater in municipal treatment plants is now used for irrigation, providing about 10% of total irrigation water.

Wastewater disposal and treatment: While waste minimisation is a key goal, released wastes still need to be treated and disposed of in safe and environmentally sound ways. Jordan has achieved a high level of sewage

treatment. Yet a number of issues still require attention. Many communities remain dependent on cesspool systems that have become inappropriate. Unplanned land use and scattering housing, industrial estates and other developments make it difficult to extend services and control health hazards. Effluent from treatment plants sometimes seeps into groundwater. A considerable portion of water used for irrigation is not clean enough for irrigation. Population growth and financial constraints have led to overloaded treatment plants.

Industrial wastewater: Industry is a -economic development and can also contribute to sustainable development with more efficient production processes, pollution prevention strategies, cleaner production technologies and waste minimisation. Clear environmental criteria and guidelines are needed to guide the siting and to assess the environmental impacts of industries.

Pollution prevention and control in industry: Pollution control can be expensive and complex to regulate. Reducing pollutants before they enter the environment reduces risks and the costs of regulation and clean up. Cleaner production can improve the competitiveness of an enterprise, improving its efficiency while protecting its personnel and the environment.

Environmental management by industry: Two key tools for helping industry comply with environmental laws and regulations are environmental impact assessment (EIA) and environmental auditing. EIA techniques help integrate environmental considerations into project design. EIA carried out early in project planning can help first to evaluate alternative sites, processes, raw materials and other design options and later to identify suitable means for mitigating effects. Auditing is a systematic evaluation

regard to environment, safety and health. It is a voluntarily, pro-active and preventive approach that benefits industry and the environment.

MANAGING SOLID WASTE:

to minimise solid waste generation, maximise environmentally sound re-use and recycling of solid waste, promote environmentally sound solid waste disposal and treatment and extend waste services.

Solid waste generation in Jordan is increasing with population growth, industrial development and new consumption patterns and life-styles. Local governments and common services councils are responsible for solid waste management but they are hindered by lack of money, skilled manpower and community awareness.

Minimising municipal solid wastes: Per capita solid waste generation in Jordan is relatively high at 0.9 kg per day. Municipal solid wastes will increase, imposing a heavy burden on waste disposal sites. Most sites will soon be exhausted, including the Russifeh landfill site currently serving 2,250,000 inhabitants. Selecting and managing new disposal sites in an environmentally sound manner will increase the cost of solid waste handling and disposal. The focus should be on reducing the generation of wastes and on

changing production and consumption patterns.

Maximising waste reuse and recycling: Solid waste managers will need to promote re-use and recycling to help reduce volumes of waste consigned to disposal sites. Sorting different types of solid waste at source will be essential to facilitate recycling and reuse. This is not yet done in Jordan and considerable amounts of recyclable materials are wasted.

Promoting environmentally sound waste disposal: There are environmental concerns at all

The design and operation of most (if not all) current sites are environmentally unsound. The impacts of these sites on groundwater, air quality and other environment components raise serious public health concerns. Disposal is by open dumping at most sites, which are not lined to prevent seepage into ground water. Some sites receive sludge from wastewater treatment plants, medical and / or industrial hazardous waste and other industrial waste.

Extending solid waste services: Safe solid waste collection and disposal are crucial for protecting public health. Solid waste collection is provided to about 75% of Jordanians and more than 90% of Greater

is to extend this to all people.

MANAGEMENT OF HAZARDOUS WASTES: This section reviews the needs to promote utional capacities for hazardous waste management, to minimise the generation of hazardous wastes, to strengthen information exchange on hazardous substances and chemical risks, to promote and strengthen international co-operation in managing trans-boundary movements and preventing illegal traffic of hazardous wastes and to ensure safe, environmentally sound management of radioactive wastes.

Jordanians need to understand the negative health impacts of certain chemicals present in their environment. This is necessary for effective management of hazardous wastes. The proposed objectives are to minimise the generation of hazardous wastes and to ensure

those that are generated.

Strengthening institutional capacities for hazardous waste management: There are little data about the quantities and types of hazardous materials disposed of or the locations where they are dumped. There are no licensed sites for proper disposal of hazardous wastes, no efforts to estimate the extent of contamination caused by improper disposal and no proposals to clean up contaminated sites. No agency is able to provide the public or specialists with information on hazardous chemicals. There are no comprehensive regulations or standards or clear government responsibilities related to managing hazardous chemicals. Existing norms for treating and disposing of hazardous wastes are widely violated.

Monitoring programs need to determine the extent of hazardous chemical contamination and its effects on public health. Emergency plans are needed in case of hazardous chemical spills or

accidents. Awareness programmes should educate the public on hazardous wastes.

Personnel trained in hazardous substance handling, transporting, treatment and disposal are insufficient. No substantive research is conducted in this field in Jordanian institutions.

Minimising and preventing hazardous wastes: Managing hazardous substances is costly, so their minimisation needs to be a top priority. Technologies and resources currently available for hazardous waste management in Jordan are insufficient. Knowledge and information on the economics of hazardous waste prevention and management are lacking and there have been no significant efforts to change industrial processes or consumption patterns.

Exchanging information on hazardous substances is necessary to ensure sound management of hazardous chemicals. For example, the use of some hazardous substances has been banned in countries producing them. Available information is inadequate for ensuring the safe use, control, distribution, storage, formulation and disposal of restricted chemicals.

Strengthening international co-operation in managing trans-boundary movements: Criteria for identifying hazardous wastes and procedures for managing their movements need to be harmonised. Jordan needs monitoring systems and programmes to ensure careful control of trans-boundary movement of hazardous chemicals.

Sound management of radio-active wastes: Jordan uses nuclear technologies in many sectors. Radioactive wastes from these applications need stringent disposal measures. Plans are underway to construct a nuclear reactor. Nuclear programs in neighbouring countries present risks of accidents and a national emergency plan is needed. Monitoring programs need to determine radiation levels all over the kingdom, especially adjacent to Israeli reactors.

Jordan needs personnel trained to handle, transport and manage nuclear substances. Specifications and standards to regulate radiation levels from electrical and electronic devices and from wastes in the work environment are also needed. Finally, awareness programmes should educate the public on handling radioactive waste and responding to radiation accidents.

AIR QUALITY CONTROL: This section looks at needs for an ambient air quality monitoring & assessment network, national air pollution control and abatement, preparedness and emergency plans, and global commitments in the field of atmospheric protection.

Emissions of five principle pollutants - particulate matter, sulphur dioxide, carbon monoxide, nitrogen dioxide and lead - have all increased significantly in Jordan in the past two decades. The Environmental Law provides a framework to protect air quality and describes the role of the GCEP in the field of air quality protection.

An ambient air quality monitoring & assessment network is needed to ensure compliance with or progress

towards meeting air quality standards. It can observe pollution trends and provide a database to support applied research, urban management and land-use and transportation planning. The network can also help develop and evaluate pollution abatement strategies and diffusion models. At the moment, co-ordination is lacking among the institutions involved in air quality monitoring and assessment. Monitoring lacks continuity and coverage of the country is incomplete, while air quality has deteriorated severely in many parts of the country.

Air pollution control and abatement: Thermal power plants, oil refineries and the Khirbet Al-Samra wastewater treatment plant all

air pollution. Vehicles are a major source of air pollution in Amman and other major cities. Phosphate mining, quarrying activities and the cement industry all contribute to elevated dust levels. The iron and steel, chemical and tanning industries also contribute to atmospheric pollution.

Comprehensive national emergency planning and preparedness are needed. Hazards and the risks they pose for communities are poorly understood at the moment.

Global commitments: Jordan has signed several global agreements on ozone layer protection. Jordan's consumption of ozone depleting substances is estimated at 1000 tones/year, or a per capita consumption of less than 0.3 kg / year.

COASTAL ZONE MANAGEMENT: This section discusses coastal zone management in the Gulf of Aqaba and Dead Sea regions.

The Gulf of Aqaba needs integrated coastal zone management, better control of urban pollution and effective plans to deal with emergencies.

coastline supports a highly diverse marine environment as well as industry and tourism, which compete for and impact upon the marine environment. The city of Aqaba has changed from a quiet fishing village to a busy port of 70,000. Industry, tourism and transport have brought economic advantages, but also adverse impacts on the environment, natural resources and the population.

The Gulf of Aqaba is semi-enclosed, contributing to its globally significant bio-diversity and unique marine ecosystem, but also limiting water exchange with the Red Sea. Low potential for dispersing oil and other contaminants is an acute lopment has brought threats to the marine environment such as phosphate dust, industrialisation and port development. The Aqaba Regional Authority alleviates some of these problems, but continued efforts and better co-ordination are needed from institutions managing the marine environment.

Aqaba city will continue expanding and all its development activities will have environmental effects that can adversely effect public health. Key issues will be related to expansion of urban infrastructure, including roads

and the expansion of tourism facilities.

There are also many hazards and risks, but no comprehensive emergency plan. Understanding of hazards (such as oil spills) and the risks they might pose is limited.

The Dead Sea region is unique and needs integrated planning and

rich natural and cultural heritage.

The Dead Sea is highly saline, with a unique topography it is the lowest place on earth. Lack of funds may slow its development while its fragile environment may not sustain the ambitious plans of developers. Salt extraction at the south end of the sea is economically important and

water and mud also has economic potential. Finally, there is considerable tourism potential, though the east shore of the sea remains relatively poor and underdeveloped.

master plan for the Dead Sea region accommodates proposals by the private sector. The plan foresees construction of 15,000 rooms and 18,000 housing units on a sixty kilometre stretch of sea shore by the year 2010, with further development projected for the Suwimeh area.

The development needs of the local population and the need for sustainable resource use must be reflected in development plans. Water and sanitation services to be developed, for example, should meet the needs of the local population.

heritage and natural beauty will need to be carefully protected during construction and operation.

PUBLIC HEALTH: This section discusses primary health care needs, control of communicable diseases, protection of vulnerable groups, meeting urban health challenges and reducing health risks associated with environmental pollution and hazards.

imary health care centres meet the needs of urban and rural dwellers. Scarcity of fresh water is the major environmental health concern, yet Jordan has been able to control most of its infectious diseases and boasts good health indicators compared to other developing countries. Rapid industrialisation is now bringing new health problems associated with changing lifestyles, increased pollution and exposure to toxic chemicals.

*Meeting primary health care needs: C*onsiderable progress has been achieved in recent years in primary health care. Almost 1100 primary health care centres served the country by 1995. Inadequate geographical distribution of health centres remains a problem though, with the Amman-Zarqa area under-served compared with the rest of the country. The efficiency of health centres also needs to be improved. Better qualified personnel and better facilities are needed at some centres. The existing health information system needs upgrading.

Control of communicable diseases: Environment-related infectious diseases are a major health issue, especially in rural areas and slums. Their control depends largely on the availability of safe drinking water, proper sanitation and waste disposal

practices. Control of disease vectors and immunisation programs are also key factors. Overcrowding and indoor air pollution encourage the spread of acute respiratory infections, a major cause of death among young children.

Protection of vulnerable groups:

under the age of 14. Falling infant mortality rates - from 151 / 1000 births in 1961 to 28 / 1000 births in 1994 - are attributed to improved health services and more educated mothers. But the health of children remains vulnerable to various environmental factors. A declining fertility rate (5.6 births per women in 1991 to a projected 4 per women by the year 2005) can be attributed to improved educational and job opportunities for women.

Migrants in refugee camps and slums generally lack proper housing, health services, sanitation and safe drinking water.

Urban health challenges: Rapid urban growth has overtaxed capacities of health services to meet local needs and exposed the population to environmental hazards. Pollution, overcrowding and inadequate housing all contribute to health problems in urban areas.

Reducing environmental risks: Pollution control, prevention and protection measures have not kept pace with the rapid industrialisation and urbanisation of recent years. Respiratory diseases and other health problems among workers can be attributed to unsafe conditions and poor indoor air quality at the workplace. Uncontrolled dumping of industrial wastes and toxic chemicals in remote areas and in sewers threatens the environment and public health. Re-use of treated domestic and industrial wastewater can lead to problems if not properly controlled and monitored. Improper disposal of hospital waste can be a major health hazard. Lack of awareness about potential health risks and environmental hazards associated with use of chemicals can lead to chemical accidents and poisonings in industry, agriculture and in homes.

CHAPTER 3 NATURAL AND CULTURAL HERITAGE: This

and cultural heritage resources and their sustainable development needs.

NATURAL HERITAGE: Jordan has a rich diversity of plant and animal species.

Plant bio-diversity: A number of

done, but much research is still needed for flowering, non-flowering and nonvascular plants. Many plant species are threatened with degradation or extinction due to both man-made and natural factors. Serious attempts have been made to

genetic resources and many reserves have been established. Yet the laws and regulations governing them are not always enforced.

Actions needed to help conserve, protect and sustain Jordan's plant genetic resources include scientific assessment of species, research into different facets of plant bio-diversity, enhanced public awareness of important plant species and implementation of conservation laws.

Detailed ecological studies of

There are few studies, for example, on the economic or medicinal values

forest ecosystems need more research especially regarding seed germination, forest regeneration, species density, coverage and distribution, and causes of forest destruction.

Reserves are needed to protect rare and endangered species in areas with fragile ecosystems. A national botanical garden is needed to conserve wild natural plant resources and maintain the gene pool of wild plant species. Research is being done to propagate and conserve some species of rare and endangered plants. Surveys and experiments to propagate and cultivate other threatened species are also needed.

Legislation should support conservation and protection of biological diversity. For example, hundreds of plant specimens are removed from the country illegally each year, including many rare, endemic and previously unknown species. Top priorities include clear rules and laws controlling genetic resources, shared benefits from using genetic resources, an office to permit collection and handling of genetic resources, strict rules controlling threats to plant bio-diversity and a more important role for reserves.

Animal Bio-diversity: Protection of animal bio-diversity through conservation of rare and threatened species and habitats is closely linked with quality of life in Jordan. Yet the concepts of conservation and sustainable use of bio-diversity are still not clear for most Jordanians. These concepts need to be integrated into the policies of all major socio-economic sectors. Conservation targets will only be achieved with clear action or recovery plans, based on current scientific knowledge, specifying conservation targets and actions needed to achieve them.

The introduction of modern vehicles and automatic weapons after 1900 led to the extinction of some species. These problems increased with the rapid population growth caused by the Arab-Israeli conflicts. Other problems for conservation of wild animal species include illegal hunting, degradation of forests, lack of management in recreational areas, loss of wetlands, lack of public awareness, lack of specialised scientific centres and weak legislation.

Available data on livestock bio-diversity in Jordan are inadequate. Yet it is clear that several breeds of domestic animals and birds have decreased, and some have disappeared, as a result of environmental and human factors.

Animal products and by-products available in Jordan have not met increasing domestic demand and imports have risen as a result. Productive breeds have been imported, affecting local breeds. Local breeds have social and cultural value and some have unique attributes for adaptation, disease resistance and specific uses that need to be preserved. Introduction of exotic breeds and of changes in livestock production systems threatens them with extinction.

CULTURAL HERITAGE: The

resources considers archaeology and

tourism, as well as the needs for a national strategy for archaeological research, for local communities to participate in managing heritage resources and for greater public awareness and strengthened legislation related to cultural heritage issues.

Destruction of cultural heritage resources, like environmental degradation, is a global problem calling for the combined efforts of the international community. Threats to cultural heritage come from several sources, including illicit trade in antiquities, haphazard development and growth and general public apathy. The result is the irretrievable loss of cultural resources.

huge economic contribution through tourism: Most tourists visit Jordan to enjoy its cultural heritage, and tourism contributed more than 11%

exchange brought in by tourists in 1994 exceeded US$ 650 million or

merchandise exports in that year. But tourism puts pressure on archaeological sites, particularly the city of Petra. The most effective way to reduce this pressure while maintaining growth in tourism is by diversifying tourist attractions. Tourists will remain attracted mostly

important to preserve these sites.

Need for integrated planning and management: The national and regional bodies responsible for

carry out integrated planning and co-ordination, management and land-use plans. Clear decision-making mechanisms and clearly defined authorities among responsible government institutions are also needed. Legislation on the roles and responsibilities of the Department of Antiquities and other national and regional government entities involved in cultural resource preservation urgently needs to be reviewed to resolve inconsistencies among authorities and mandates.

A clear strategy is needed for building capacities of the institutions and people responsible for cultural resources. Financial and administrative constraints and limited technical expertise impede conservation of cultural resources. The government institutions and NGOs involved in the protection of architectural heritage need to be evaluated and enhanced.

Strategy for developing and protecting heritage sites: The

strategy should include development and protection of archaeological and cultural sites, supported by proper laws. The roles of local governments, municipalities and local councils need to be clearly defined. A new strategy for investing in tourism should be developed. Proper training and capacity building of related bodies will be essential to enhance local decision-making capacities and to ensure satisfaction of the needs and aspirations of local communities, local governments and the central government.

CHAPTER 4 LEGISLATIVE AND INSTITUTIONAL ISSUES FOR SUSTAINABLE DEVELOPMENT: This chapter discusses the needs to formulate new laws and regulations in support of sustainable development, as well as

strengthening or improving enforcement of existing ones. It also discusses the need to strengthen the General Corporation for Environmental Protection. A proposed national system for Environmental Impact Assessment is attached as Annex 1.

Jordan needs clear and effective laws and regulations to support emerging sustainable development strategies and policies. A wide range of issues should be considered in developing these laws and regulations. Enforcing these laws and regulations will be crucial for transforming sustainable development strategies and policies into action.

Jordan has developed some notable legal instruments in support of sustainable development in recent years, such as the law for Environmental Protection No. 12 (1995).

LAWS AND REGULATIONS IN SUPPORT OF SUSTAINABLE DEVELOPMENT: In the past ten years Jordan has tried to integrate its legislation on environment and development to better promote sustainable development. Yet most socio-economic development plans still do not pay serious attention to sustainability issues or the need for integrated development approaches. For example, Jordan has formulated a number of economic laws and regulations in recent years to promote investment and economic development and respond to the -economic circumstances. The requirements and principles of sustainable development have been given little or no consideration in most of these laws and regulations.

Science and technology have important roles to play in support of sustainable development. These roles should be promoted actively with appropriate legal (and economic) instruments.

To date Jordan has established one principal environmental law and this law now needs to be applied through the development of the necessary by-laws, directives, and other legislative

environmental law also needs to be effectively reconciled with other national laws dealing with environmental issues. The institutional framework for environmental protection in Jordan also needs revision.

to sustainable development need to reflect the principle of integrating environmental protection with socio-economic development in a more comprehensive way. This will require improving and adjusting existing legislation aimed at promoting sustainable development and introducing new legislation focused on increasing the sustainability of Jordanian economic and social development policies and programmes. Local legislation also needs strengthening to ensure sustainable development principles are effectively integrated into local development strategies, policies and programmes. Finally, there is a need to ensure that Jordan is in accord with international norms and practices in developing legislation, technical regulations and standards related to sustainable development.

ENFORCING LAWS AND REGULATIONS: The value of laws and regulations in support of sustainable development will depend

on their actual enforcement. Jordan needs to address a number of challenges related to the enforcement of the law for environmental protection.

STRENGTHENING AND ACTIVATING ENVIRONMENTAL LEGISLATION: Jordan has a National Environmental Strategy, a National Environmental Action Plan and its first law on the environment - the Law for Environmental Protection (1995). The General Corporation for Environmental Protection (GCEP) is responsible for overseeing the implementation of the law. For a number of reasons, the enactment of this law and the establishment of GCEP have not had much effect on environment management in Jordan to date. The

capabilities, for example, do not meet the requirements of its mandate and the law has certain defects. The mechanisms for activating the law are vague and weak and there is no clear systematic legal mechanism for its enforcement. The activation of the law has been slow, partly as a result of the slow process of enacting the by-laws and regulations needed to enforce it.

STRENGTHENING AND EMPOWERING GCEP TO FULFILL ITS MANDATE: The GCEP needs strengthening, particularly to ensure its ability to properly enforce the Law for

management and data processing systems need upgrading, as well as their systems for exchanging information both within GCEP and between GCEP and its partner organisations in Jordan.

CHAPTER 5 EDUCATION AND AWARENESS: This chapter

promoting environment and sustainable development education among different target groups, promoting integration of sustainable development issues within human resource development programmes and promoting greater awareness of sustainable development issues. The

National Strategy for Environmental Education, Awareness and Communications.

PROMOTING ENVIRONMENT AND SUSTAINABLE DEVELOPMENT EDUCATION: Efficient and consistent use of advanced scientific and technological knowledge in many disciplines is needed to help Jordan move towards more sustainable development. New knowledge and new technology requires new curricula for environment and sustainable development education.

Environment and sustainable development education at universities:
should play a lead role in sustainable development education and in supporting research into both preventive and remedial solutions to sustainable development problems. University students in all disciplines need
key environment and sustainable development challenges and options.

Improved co-ordination and harmonisation with regard to environment and sustainable development education is needed among the different universities and at lower levels.

Few authorities are currently able to provide specialised information about different sustainable development issues and options of interest for Jordan. There is also a shortage of adequately trained personnel. For example, most Jordanian specialists lack the experience and skills needed to work well in multi-disciplinary teams.

No substantial environment or sustainable development research being is carried on by Jordanian institutions and there are no doctoral programs in related areas. There is a need for partnerships between our universities and international institutions to facilitate the transfer of up-to-date knowledge and expertise.

Public sector environmental education: All students at the basic and secondary stages should be made aware of environmental problems and related laws and regulations, ethics and responsibilities. Environmental education needs to focus on issues like the need to protect natural resources, the nature of local and regional environmental problems and specific relevant issues such as integrated pest management, population problems and their relationship with environmental degradation. There is also a need to encourage changes in consumption patterns and greater participation in local and regional environmental projects and in decision-making processes in general.

Non-formal environmental education: The process of non-formal environmental education (NFEE) provides people with functional environmental knowledge, awareness, and skills. NFEE helps bring about fundamental shifts in attitudes and new commitments to cleaner and more efficient ways of doing things. NFEE focuses on people from all walks of life and age groups and can be done by the school system, NGOs, institutions, businesses, foundations and the private sector. NFEE provides the information, skills and technologies needed to address the most urgent environment and sustainable development challenges facing Jordan.

PROMOTING INTEGRATION OF SUSTAINABLE DEVELOPMENT ISSUES INTO HUMAN RESOURCE DEVELOPMENT: Jordan has considerable capacity for training government, private sector and NGO staff. This capacity needs strengthening. The King Hussein Environmental Training and Management Program offers a model, focusing on human resources development in environmental impact assessment, environmental audit, environmental law and public awareness. Other training centres can be upgraded to integrate sustainable development issues into their curricula and training activities. The Vocational Training Centres, for example could focus on integrating ecological considerations at the management level.

Training programmes: Environment and sustainable development issues are ignored in most training programs. Their integration into sectoral training programmes is impeded by poor co-ordination among training institutions and programmes. Where environment and sustainable development training does exist, it suffers from financial constraints, lack of independence, bureaucratic laws and regulations

and institutional weaknesses, including lack of systematic monitoring and follow-up. NGOs are a focal point for many women in Jordan and if NGOs had the technical skills they could play a major role in planning and implementing training programmes.

PROMOTING AWARENESS OF SUSTAINABLE DEVELOPMENT ISSUES: *T*he law alone cannot protect the common interest. This also requires the support of informed communities. Public media need to communicate the necessary information to these communities. Protecting the common interest requires a high degree of public participation in decisions that affect the environment. This can be achieved by making communities aware of their environment and by giving them effective say over the use of the resources they depend on.

Individuals need to be persuaded to act in the common interest. Effective participation in decision making in communities helps them articulate and protect their common interests. Media can support communities by providing timely, unique access to the public and special groups allows them to make their options and make informed decisions. Constraints to raising public awareness include limited technology and expertise available inaccurate and insufficient information available to the public and journalists, lack of training to support awareness campaigns, little sense of personal responsibility for environmental issues, lack of continuity and money needed for awareness campaigns.

To carry out awareness campaigns effectively, journalists need training on the issues, access to information, opportunities to participate in the sustainable development processes, communication plans targeting specific groups and, especially, personal commitment.

CHAPTER 6 SOCIO-ECONOMIC ISSUES: This chapter considers some key socio-economic challenges linked with sustainable development in Jordan: combating poverty, population planning, changing consumption patterns and issues related to youth, children and women.

COMBATING POVERTY: Poverty is reflected in poor nutrition, low life expectancy, imbalance between income and necessary expenditures and high levels of infant mortality. The most severe poverty in Jordan is found among the urban poor (especially squatter areas), refugee camps, and remote rural areas. The urban poor often lack adequate access to health, water, sanitation, and other basic services. It is necessary to provide all Jordanians with opportunities to earn sustainable livelihoods. An integrated strategy is needed for poverty stricken areas.

awareness and understanding of sustainable development issues.

National environmental awareness and communication program: It is very important to raise public awareness of environment and sustainable development challenges, and of the options for addressing these challenges. Institutions, firms and individuals all need to be encouraged and helped to evaluate

YOUTH IN DEVELOPMENT:

population. They need a role in protecting the environment and in decisions on environment and development. Problems facing

unemployment and poverty, rising drugs use, lack of institutions and activities meeting the needs of youth, lack of information and awareness programmes about health and environment and early marriages that put extra economic pressures on youth.

FOCUSING ON CHILDREN: Commitment to the care and protection of children is deeply rooted in Jordanian culture and society and remains at the forefront of the national agenda. This is reflected, for example, in the universal immunisation coverage against the six killer diseases, provision of education for all, and ratification of the convention on the Rights of the Child. Many problems facing children in Jordan today are due to recent economic stagnation. Declines in family incomes lead to

hygiene and education levels. There is a growing phenomenon of children between six and eight years on the streets to earn money to sustain their families. Child labour, though illegal, exists in Jordan. Child abuse is thought to have increased due to the economic stress endured by poor families.

WOMEN IN SUSTAINABLE DEVELOPMENT: Women need to participate more in defining policies and programs for sustainable development. It is very important to ensure a gender perspective is integrated into the policies of all socio-economic sectors. Yet

decision making and planning related to the use and management of resources and protection of the environment for example, is minimal, in spite of the increasing of percentage of educated women. Environmental awareness programs relating to the use of and exposure to agricultural pesticides and herbicides are not directed at rural women, who are nevertheless major users of these products. Women bear primary responsibility for child rearing and many are also basic education teachers. They could ensure positive attitudes and behaviour towards the environment among children and youth. Training can help women heads of households to adopt environmentally sound income generating activities. The existing NGO network working with women should be provided with the knowledge and skills they need to help them raise environmental awareness.

POPULATION PLANNING:

rapidly in the past forty years leading to unbalanced utilisation of natural resources, increased environmental pollution and
rapid urbanisation. A high percentage of the population is young, economically dependent and attending educational institutions. Unemployment is rising among new entrants into the labour market and demand for basic social amenities is rising rapidly. There is a widening gap in income distribution and growing poverty.

CHANGING CONSUMPTION PATTERNS: Over-consumption by certain segments of society also

negatively effects the environment and needs to be addressed.

CHAPTER 7 INFORMATION FOR DECISION MAKING: This chapter has been prepared by many of the same specialists who prepared

Information Strategy (provided in Annex 2), which complements and supplements the chapter.

Accurate and timely information is a powerful tool for sustainable development, where everyone is both a user and a provider of information. Decisions at all levels need to be based on sound information. The -

technologies but the information underlying these technologies. The relative positions of nations, groups and individuals within societies will be determined to a large extent by their capacities for collecting, organising, analysing, distributing, protecting and using information.

Information is pervasive in nature and touches every aspect of human activities. It is characterised by strong interaction and interdependence among different sectors. Changes in the way information is handled in one sector affects other sectors. The co-ordination of information-related activities across all sectors of the Jordanian economy must be a collective effort at the national level.

Jordan needs increased collection of data relevant to sustainable development, improved co-ordination among information management activities, improved methods for data analysis and assessment (including indicators of sustainable development), transformation of existing information into forms more useful for decision-makers, proper mechanisms to permit efficient and harmonised information exchange, procedures for documenting and sharing available information and development and facilitation of electronic networking capabilities.

Problems include inadequate information management, lack of awareness of the value and availability of information resources, lack of financial resources and trained personnel needed to effectively manage information and lack of the technology needed to access information.

Access to and management of

environment, and on current trends and policies related to its sustainable development, are highly problematic. Much information exists in the

universities, research centres and other institutions. Yet these institutions find it difficult to make this information available to others.

CHAPTER 8 PROJECTS: This chapter summarises priority projects needed to promote sustainable development approaches in water resource management, agriculture, energy, environmental management, bio-diversity protection and tourism.

WATER RESOURCE MANAGEMENT PROJECTS: The following projects are considered the highest priorities for promoting sustainable water resource management in Jordan:

- Water resources assessment projects,

- Water feasibility studies,
- Rehabilitation of water distribution to urban areas,
- Construction of a national water carrier,
- Water desalination project,
- Wastewater treatment and networks projects,
- Projects to augment water supply,
- Institutional restructuring projects,
- Human resource development project,
- Irrigation network and canal improvement projects,
- Water importation, and
- The Red-Dead canal.

AGRICULTURE PROJECTS: The following projects are considered the highest priorities for promoting sustainable agriculture in Jordan:

- Management of crop, water and nutrients needs under different soil -water regimes,
- Soil management under irrigated and rain-fed conditions,
- Re-use of treated waste water in agriculture,
- Improving local livestock by artificial insemination and embryo transfer,
- Integrated pest management,
- Introducing new crops of high gross margin,
- Recovering animal feed from plant debris,
- Certification program,
- Upgrading of the agricultural labour force,
- Water spreading in Marab,
- Re-structuring of agricultural research activities,
- Disease-free repositories for fruit crops, and
- Introducing drought and salt-resistant crops.

ENERGY SECTOR PROJECTS: The following projects are considered the highest priorities for promoting sustainable energy production and consumption in Jordan:

- Oil shale utilisation,
- Renewable energy,
- Fossil fuel exploration, and
- Geothermal plants.

ENVIRONMENTAL MANAGEMENT SECTOR PROJECTS: The following projects are considered the highest priorities for promoting environmental management in support of sustainable development in Jordan:

- Studies on the composition and characteristics of solid waste to provide technical data for recycling and public awareness program on recycling,
- Recycling of organic and inorganic wastes in the Amman-Zarka area,
- Soil and water investigations at the land fill disposal sites,
- Incineration plants for solid wastes in the Amman-Zarqa area,
- Management of agricultural plastic waste,
- Bio-gas extraction from organic wastes,
- Control of noise pollution,
- Capacity building of environmental health laboratories and services,
- Upgrading of health information system,
- Strengthening of occupational health safety measures,
- Encouraging and strengthening environmental epidemiology research,
- National air pollution monitoring network,

- Indoor air quality monitoring, and
- National network of healthy cities and villages.

BIODIVERSITY PROJECTS: The following projects are considered the highest priorities for promoting conservation of biological diversity in Jordan:

- General herbarium,
- National botanical garden,
- Geographical distribution and monitoring of rare, endangered and threatened species, populations and ecosystem,
- In-situ and ex-situ conservation of genes, species, population and ecosystems,
- Bio-diversity training centre,
- Completion of the protected areas network,
- Enforcement of environmental legislation related to bio-diversity, and
- Regional environmental training centre.

TOURISM PROJECTS: The following projects are considered the highest priorities for promoting sustainable tourism in Jordan:

- Amman downtown tourism zone,
- Dead Sea panoramic complex,
- Madaba-Dead Sea park,
- Kerak tourism development,
- Petra region infrastructure development and environmental management,
- Wadi Ram infrastructure development and environmental conservation,
- Karak and Jarash tourism development pilot program,
- Sector development support,
- Creation of a national register of archaeological and cultural resources in Jordan,
- archaeological database information system,
- Jordan national museum, and
- Preservation and restoration projects at Qasr al Bint /Petra, Umm al Jimal, Qasr al 'Abd/Iraq, al Amir/ Amman, Umm Qays, Tabaqat Fahl (Pella of the Decapolis), Qusayr 'Amra and Historic Old Salt.

CHAPTER 9 LINKAGES FOR THE NATIONAL AGENDA 21: This chapter calls for a national partnership for sustainable development where all sectors will make social, economic and political commitments to ensure the transition to sustainable development.

Sustainable development requires partnerships based on broad coalitions of interest. Forming these partnerships will require more than just willingness and commitment; it will also require awareness and understanding. Concern for the environment needs to touch every sector, every community and every institution. The integration of environment and development should be reflected in a re-orientation of attitudes, in changes to decision-making processes and in modification and strengthening of institutional arrangements at national

Agenda 21 will have to maintain links with NGOs, local communities, major development plans, the scientific and professional communities and the international community.

CHAPTER 10 MOVING FROM THE NATIONAL AGENDA TO LOCAL AGENDAS: This chapter looks at the need to begin initiating local sustainable development agendas in Jordan, focused on different areas of concern. It suggests guidelines and prerequisites for developing these local agendas.

INITIATING LOCAL AGENDAS IN JORDAN: Experience gained in

combined with growing regional and global experience in the development of local agendas, will be valuable for local agenda building in Jordan. Local agendas will need to be carefully co-ordinated with the national Agenda.

Local agendas can help communities and other groups enhance their understanding and awareness of their situations of the sustainable development challenges facing them and of the options available for addressing these challenges. Formulating local agendas can help communities and other groups discover their potentials, develop their capabilities, and tap available resources. Local agendas should be developed through participatory processes, using many of the same tools used to develop the National Agenda 21. Developing local agendas introduces communities and other groups to new approaches and skills, such as problem-solving techniques and communication skills, which can help them come to terms with the complex environment and development challenges they face.

AREAS OF CONCERN FOR LOCAL AGENDAS IN JORDAN: Local agendas 21 help define sustainable development priorities, strategies and options. A local agenda may focus on a certain location, such as a city, a watershed, a valley or an archaeological site, or it may be for a specific sector, such as water, agriculture, industry or education.

GUIDELINES FOR LOCAL AGENDAS: Guidelines and manuals reflecting Jordanian reality local concerns, constraints, opportunities and values will be an important part of promoting local agendas in Jordan. These guidelines and manuals can draw on valuable experience from countries like Morocco (where an increasing body of resource material is available in Arabic) and Turkey and on the expertise and guidance of organisations such as the International Council for Local Environmental Initiatives. Common elements that have emerged in most successful processes for developing local sustainable development strategies include partnerships, community-based issue analysis, action planning, implementation with careful simultaneous monitoring and effective evaluation and feedback mechanisms.

PRE- REQUISITES FOR LOCAL AGENDAS: A number of conditions will help ensure the

national Agenda 21 needs to be formally adopted by the government and a follow-up and monitoring unit for this agenda needs to be established. This unit can provide guidance and advice to local agendas, linking them with the national agenda. Another important condition is that the national government and international

agencies working with them

to move towards more sustainable development.

CHAPTER 11 MONITORING AND REPORTING ON IMPLEMENTATION OF The final chapter discusses the need to

Agenda 21, what kinds of monitoring and reporting are needed, how to do it and who should be involved.

WHY MONITOR THE IMPLEMENTATION OF The main reasons for monitoring

21 in the future will be to measure and report on progress being achieved, to strengthen participatory processes, to learn from experience

experiences with other countries.

WHAT KIND OF MONITORING AND REPORTING? Monitoring

or-

character, opportunities, needs and

Reports should be regular and timely, credible and objective, concise, easily understood and widely disseminated among national stakeholders. These stakeholders should be involved in gathering, compiling and analysing monitoring information. Subjective monitoring instruments such as case studies and interviews / questionnaires should be combined with monitoring of key indicators to provide a balanced picture of the evolving situation.

HOW TO DO MONITORING AND REPORTING? Monitoring and reporting should be rigorous and encourage learning from experience.

monitoring. Monitoring should be as simple as possible, not too standardised or too complicated, and not putting unrealistic demands on those responsible. A national Agenda 21 office should lead the

implementation and help ensure that monitoring information is used effectively.

WHO SHOULD BE INVOLVED? A national Agenda 21 office, together with principal stakeholders, should clearly identify the monitoring roles of each partner

Agenda 21, including government agencies, private sector organisations, NGOs and the Agenda 21 office itself. It will be important to ensure national stakeholders are fully involved in the both designing and carrying out this monitoring - this will help strengthen their ongoing participation in the national dialogue on sustainable development.

ANNEX 1 A NATIONAL ENVIRONMENTAL IMPACT ASSESSMENT SYSTEM: This annex summarises a proposed national environmental impact assessment (EIA) system for Jordan.

INSTITUTIONAL & ADMINISTRATION REQUIREMENTS: The first section of the annex identifies the institutional and administrative requirements of the proposed EIA system. It identifies the required personnel, including project co-ordinators, environmental researchers and an EIA director. The

functions of the different divisions and the scope of their work are summarised.

The next section describes the proposed procedures for carrying out EIAs. The first level of procedures includes initial filing, obtaining directives, scoping the key issues and preparing proposed terms of reference for any required environmental studies, for the approval of the GCEP. The next level involves carrying out EIA and preparing technical report, called an Environmental Impact Statement (EIS), to be reviewed by the GCEP. T
not the proposed development project can proceed. The last level is an environmental management plan (EMP) detailing the environmental management measures needed to ensure that the project will not exceed the environmental impacts predicted in the EIA. The project proponent is responsible for implementing this EMP.

There are several annexes to this section on institutional and administrative requirements. The first is the project information form to be completed by the proponents of all development projects prior to licensing. The purpose of this form is to determine whether or not the proposed development project is exempted from registration for environmental impact assessment.

The next annex is a list of those activities that are subject to EIA procedures and approval prior to any other licensing by public authorities. The different types of activities requiring an EIA are summarised, including various kinds of:

- energy production,
- chemical & pharmaceutucal industries,
- metallury & metal works,
- mining & quarrying,
- textiles, paper and leather industries,
- timber production & processing industries,
- food production & processing industries,
- rural development & agricultural projects,
- industrial park development and implementation,
- major urban development works,
- tourism development, infrastructure and improvements, and
- physical infrastructure development.

The third annex discusses scoping and terms of reference. Scoping is an important early step in EIA that identifies the important issues to be considered in the assessment and eliminates those that are not important, thus ensuring that time and money are not wasted on unnecessary investigations. The terms of reference set out what the EIA will cover (the scope of the EIA) and how it will be managed.

A final annex describes the required contents of an environment impact statement (EIS), including:

- executive summary
- introduction
- project description
- scoping of issues
- EIA methodology used
- assessment potential impacts
- conclusions and
- appendices.

DIRECTIVES FOR ENVIRONMENTAL IMPACT

ASSESSMENT AND ENVIRONMENT IMPACT STATEMENTS: The second section of the annex provides draft directives to guide EIAs in the food processing and mining and quarrying sectors. The proposed directives for each sector include first, general orientation and guidelines and second, additional information and instructions specific to the sector.

The orientation and guidelines sections describe how the

presented in the EIS and the nature of the information to be included. This must include descriptions of:

- the proposed activity and preliminary identification of probable sources of eventual pollution;
- any required site preparation and construction activities;
- a detailed description of the planned activity and preliminary identification of potential sources of pollution, such as handling of raw materials and finished products, energy use and transportation; requirements;
- any special risks or potential accidents;
- alternative approaches considered and how the final option was selected;
- the potential impacted by the fac
- the physical, human environme to be affected;
- the time horizon of the proposed activity;
- expected impacts on environment, including direct, indirect and cumulative or synergistic effects;
- proposed measures to mitigate impacts, including both siting of the facility and operative measures such as pre-treatment of liquid effluents, recycling of treated effluents, filtering gaseous emissions, management of solid waste and so on;
- a summary estimation of the financial implications of the mitigation measures to be taken;
- a brief reiteration of the key elements of the EIA;
- management plan; and
- appendices containing pertinent reference documents and data, additional information and sources, analyses, reports, maps, photographs, photo-interpretation, modelling results and so on that were used or referred to in the EIA.

EIA BY-LAW: The final section of the Annex is a proposed by-law on EIA. This includes definitions of the

requirements of the by-law, its scope and its implications.

Executive Summary

Executive Summary

INTRODUCTION:

NATIONAL CHALLENGE, GLOBAL COMMITMENT: Jordan is highly dependent on its fragile environment. Ensuring that environmental resources water, soil, plants and so on - are used in a sustainable manner is one of our most urgent commitment to the principles of sustainable development was confirmed at the Earth Summit in Rio de Janeiro in 1992. An action-oriented national agenda for sustainable development in the coming century - 21 - has been prepared over the past three years.

National effort needed: Achieving Agenda-21 will require a concerted national effort involving new political, social and economic partnerships. Firm commitments will be needed to ensure the necessary capacity-building, information, improved institutional and legal arrangements, technology and money. Integration of environmental and socio-economic development concerns will need to be reflected in new attitudes, changes to decision making processes and improved systems for planning, implementing and monitoring all major initiatives in the country.

Building national capacity: To make the transition to more sustainable development, Jordan will need to build its domestic capacity for addressing a wide range of sustainable development challenges described in detail in the national agenda. Capacity building for sustainable development will need to integrate Jordan's indigenous knowledge and cultural heritage with modern knowledge and technology. Our ability to move towards a sustainable society will be determined to a large extent by our national capacities to make independent, equitable and well informed decisions. These decisions need to reflect our real environmental potentials and limits on the one hand, and the needs and aspirations of the Jordanian people on the other hand.

Participatory process: Agenda 21 was developed through an extensive participatory process that forged national consensus while building national capacities and strengthening the sense of ownership development agenda. The document was drafted by fifty Jordanian public and private sector specialists from many fields.

The work of all these national experts has been integrated into a single document organised into three sections. The first section (chapters 1 3) reviews the key sustainable development challenges facing Jordan and the best ways to meet these challenges. Issues are analysed, national objectives proposed and the concrete actions needed to meet the objectives are defined. Much of the second section (chapters 4 7) follows the same format, discussing critical cross-sectoral challenges and instruments

available for facing these in coming years. The third section (chapters 8 11) looks at how to implement the agenda. Additional, related work, much of it done by the same Jordanian experts, is annexed to the national agenda. A complementary document contains the detailed baseline reports prepared by all the working groups.

The longer term value of the Agenda 21 process: The Agenda 21 document itself is not the only

Agenda 21 process. The experience gained in formulating the national Agenda 21 will also prove valuable when developing the tools needed to implement the many activities called for in the agenda.

The necessary follow-up: A sustained, concerted effort is needed to ensure effective implementation

Agenda 21 committee, representing government, NGO and private sector interests in many sectors will need to periodically review progress towards the goals of the agenda, and review these goals from time to time to ensure they remain relevant to ving circumstances.

CHAPTER 1 INTEGRATED RESOURCE MANAGEMENT:

The first chapter of the national Agenda 21 looks at sustainable development questions related to the integrated management of the

energy and mineral resources.

WATER RESOURCE MANAGEMENT is clearly the most important resource management issue in Jordan. This section of the Agenda examines a wide range of interrelated issues: integrated management of water resources, water resource assessment, protection and management of potable water supplies, water quality and aquatic ecosystems, sanitation, and integrated water management for sustainable urban development and for sustainable food production and rural development. It also looks at the probable impacts of climate change on water resources in Jordan. Finally, it considers issues associated with the institutional and financial structure of water management in Jordan.

Most of Jordan is either arid or semi-arid. Most water for municipal water supply and industry currently comes from groundwater and springs.

Integrated water resource management is a prerequisite for the development of all socio-economic sectors. The future of irrigated agriculture in Jordan, for example, is severely constrained by water scarcity. With current trends and policies unchanged, Jordan non-renewable groundwater reserves will be exhausted in 50 years.

Water resources assessment and monitoring are key issues for water resource development, management and planning. Planning and policy formulation for the utilisation of water resources must be based on reliable assessment of these resources. A monitoring network for surface and groundwater resources is operating currently but suffers from malfunctions and / or errors in data collection and processing.

Deterioration of both surface and groundwater resources is a major

concern in Jordan. It is due mainly to increased industrial activity, over-exploitation and population growth.
Water demand in Jordan exceeds available renewable supply. As a result, groundwater levels are declining and water quality is deteriorating. The efficiency of delivery of both irrigation and urban water supply is very low.

Water demand management may prove less expensive, more sustainable and easier to implement than supply expansion. The surface water forms 65% of the total available water resources. For this reason, the surface water should be managed carefully to support the groundwater resources, which are being exhausted.

A high percentage of Jord population lives in urban centres where many key environmental problems are related to water, such as waste water disposal, watershed protection and control of industrial water pollution.

Water for agriculture: Population growth, improved living standards, urbanisation and industrialisation have all contributed to great increases in water demand by sectors other than agriculture. Agriculture today suffers from acute water scarcity. Decreased water availability for agriculture makes it essential to ensure efficient management of irrigation water, the adoption of new water-saving technologies and the improvement of rain-fed agriculture.

Global warming scenarios for the next 50 years foresee a rise in global temperatures that would result in a decrease in rainfall in Jordan, with disastrous impacts on water resources and agriculture. Jordan will need to develop new policies or adopt existing policies of social and economic development that take into account the potential impact of climate change.

Fresh water supplies in Jordan are mostly conventional groundwater resources. These are limited and in many cases over-committed. There is growing demand for fresh water in all sectors and this will widen the gap between demand and supply. Developing new fresh water resources is too expensive for sectors such as agriculture. Some fresh water reserves decline in quality when groundwater is overexploited, leading to intrusion of salt water, or when reclaimed wastewater is mixed with surface water. The most important conventional fresh water resources, including the Disi Aquifer in the south and Yarmouk River in the north, are shared with neighbouring countries. No agreements govern the use of this water.

Institutional arrangements in the water sector are unable to meet the challenges facing Jordan. Institutional restructuring is essential for better water resources management.

Public and private sectors both need to recognise water as an economic commodity, rather than a social entitlement, and to begin charging prices reflecting the full costs of water use. Cost recovery will require efficient services for metering and billing.

LAND RESOURCE MANAGEMENT is another key sustainable development issue for Jordan. This section in the national

Agenda 21 considers issues of agricultural and range land management, preventing land degradation and desertification, forest management, urban planning and related legislative and institutional issues.

Expanding human activities place resources and create a host of environmental problems. Land use in Jordan is unbalanced and suffers from conflicts among the major land uses. Integrated land use planning, supported by appropriate legislation, is needed to balance the demands of multiple users.

Agricultural land: agricultural potential is limited. Rain-fed agricultural is limited by scarce, irregular rainfall in most areas and by steep slopes in areas of

range lands are unable to economically produce feed for fattening and milk production. Overgrazing, a succession of droughts and the appropriation of the better lands for rain-fed crops have decreased fodder availability without a decrease in livestock numbers.

Scarce surface and ground water resources constrict the expansion of irrigated agriculture. Potentially irrigable lands are largely confined to the Jordan Valley. Agricultural land is also characterised by the preponderance of small size farming units over 40% of holdings are between 0 and 2 hectares, while almost 70% are less than 5 hectares.

Severe limitations of agricultural land are aggravated by the loss of the best agricultural land to urbanisation and industrial uses. Land available for agriculture is further reduced by the fallow system and by land speculation. Most of the Badia have traditional rights to communal land, which impose constraints on its development.

Range lands cover over 90% of Jordan and most are presently in poor to very poor condition. They urgently need demarcation, re-organisation, management plans and action programmes. In most cases, current production is between a third and a sixth of its real potential. The main cause of this low productivity is overgrazing. Another factor has been cereal cultivation on marginal lands. Uprooting of shrubs and other plants for firewood deprives range-lands of their natural protection, further intensifying wind and water erosion.

Natural forests cover less than one area. These areas are fragmented and mostly unmapped. Most are degraded with little natural regeneration. All forests, including re-planted areas, cover less than one percent of the country. Large areas of these forests are threatened by pests, misuse and pressure from illegal cutting. Another one percent in hilly, stony areas without any actual forest cover.

from erosion and stabilise watersheds and other fragile areas, helping preserve the integrity of agricultural land. Forests can also improve local climate and water regimes, crucial for agriculture. recreation and tourism - more than two millions residents visit them every year.

A national forest monitoring plan is essential to forest management and sustainable forest utilisation.

needs improvement. Despite some gains, many problems remain, including illegal grazing and cutting, fires and ownership questions.

Land degradation: Arid and semi-arid lands, such as found in most parts of Jordan, tend to support relatively fragile ecosystems. Human interference can easily result in land degradation, such as salinisation of irrigated soils. Over half of rain-fed agriculture takes place on lands that are subject to accelerated soil erosion. Much semi-arid range land has been converted to unsustainable forms of agriculture.

Contamination of land in Jordan results from pollution by plastic waste, agricultural pesticides and herbicides, salinisation of irrigated soil and contamination from wastewater, especially in the Zarqa Basin.

Mining also causes loss of agricultural land: Most phosphate and potash production takes place in remote areas, while cement and other quarrying activities affect populated centres.

Urban land planning: Urban environmental problems are increasing in Jordan. Industries concentrate near urban areas, especially Amman, Zarqa and Aqaba. Negative interactions between industries and urban centres occur due to poor urban planning. Lack of mass transit contributes to air pollution from vehicular emissions, especially in Amman.

Legal and institutional: Existing planning laws, building regulations and permits require major revisions. Overlapping institutional responsibilities for land management lead to policy conflicts. Lack of comprehensive land use legislation contributes to land degradation, loss of agricultural lands and bio-diversity. Well-trained specialists are in short supply.

AGRICULTURAL RESOURCES:

This section looks at the need for improvements in agricultural productivity, in the management of irrigation water and in the technology for sustainable agriculture. It also considers issues related to rural development and the agricultural labour force.

Agricultural productivity: Agriculture must keep up with

Agricultural inputs have to be intensified to compensate for limited arable land and to avoid expansion into fragile marginal lands. Yet intensifying inputs creates environmental risks. There is an urgent need to maximise yields while minimising risks.

Managing irrigation water: agriculture suffers from scarcity of water that will be aggravated by the increasing water demands of different sectors in coming years. Available aquifers are shared with neighbouring countries and no common agreements have been reached to ensure their rational use and protection. Options include constructing new dams and reservoirs, re-using treated wastewater, changing crop patterns, introducing drought-resistant crops, improving efficiencies of irrigation

systems and desalinating sea water. Improved irrigation management can be achieved by better protection of water from contamination by agro-chemicals and industrial wastes, by a monitoring system and by public awareness programmes.

Sustainable agricultural technology:

hampered by a shortage of researchers and the lack of a coherent strategy. The National Centre for Agricultural Research and Technology Transfer suffers from inadequate resources and facilities. It focuses on isolated problems, rather than production systems. Sustainable agricultural technology needs to combine high productivity with high quality, making optimum use of scarce resources.

Rural development and labour:

labourers are non-Jordanians sending remittances abroad. More Jordanians need to be involved in the sector. At the same time, social security benefits, socio-economic and education programmes need to be extended to agricultural workers. Rural centres continue to suffer from loss of population through migration to urban areas. There is a need to improve rural living conditions and increase rural economic options, such as cottage food industries and off-farm income generating activities.

ENERGY RESOURCES: This

coherent energy policies, improved energy conservation and management, careful assessment of options for using oil shale and further development and exploration of conventional oil and gas resources. Finally it considers needs to investigate and promote new, renewable and alternative energy sources.

Energy issues pose a complex set of challenges for Jordan. Socio-economic development needs large amounts of energy. Jordan currently imports most of its commercial energy in the form of oil and this is a burden on the national economy. Large investments are needed to develop national energy supply options. Sustainable development in the energy sector can be achieved with a long-term strategy that strengthens energy planning and management and integrates them effectively with the relevant economic and development policies.

Formulating coherent policies: The national economy is closely linked with the energy sector, which contributes greatly to national development and economic growth. The needs of socio-economic development and environmental protection require carefully integrated energy, environmental and economic policy, planning and management. For example, Jordan has recently formulated a growth-oriented economic adjustment strategy integrating environmental concerns. The strategy focuses on achieving real progress in industrial and agricultural development through the optimal utilisation of scarce resources. It sets out the Government's expectations and targets for the energy sector, along with other sectors of the economy. The strategy calls for strengthening planning, management and technical skills in the energy sector.

Improving energy conservation and management are key elements of

bill. There is a need to improve energy conservation and optimise energy use because most economic growth in Jordan to date has been

aims to reduce the economic burden of imported energy and reduce the need for new investments, while alleviating environmental impacts of energy production and consumption.

Utilising oil shale: Jordan has oil shale reserves of more than 40 billion tons with an average oil content of about 10%. The exploitation of this oil shale is technically viable, but its economic feasibility depends on higher oil prices. If utilised, oil shale could

requirements for over a century.

Developing conventional oil and gas: Jordan depends almost entirely on imported oil to meet its energy needs. Domestic oil and gas reserves represent only about 1% and 4% respectively of imported quantities.

Promoting new and renewable energy: Jordan has an abundance of renewable energy resources, such as solar and wind. Small hydro, bio-gas and geothermal are also viable options. Renewable energy currently accounts for only 2% of energy use, mostly solar water heaters. Other applications include a solar pond, two wind farms for electric power generation, water pumping by windmill and photo voltaic cells for rural electrification.

Alternative energy resources: Other possible energy alternatives for Jordan include the tar sands near the Dead Sea, hydro-electric dams, geothermal energy and bio-mass.

MINERAL RESOURCES: Mining has been taking place in Jordan since antiquity. Since 1965 the Natural Resources Authority has been entrusted with responsibility for defining mining policies and plans and carrying out exploration for mineral resources and industrial rock in Jordan, in co-operation with other concerned authorities. Based on their work, many industrial rocks are mined today to supply the national and export markets. A number of industries such as ceramics, cement, fertilisers, glass and brick making have developed using locally available minerals.

Factors hindering the development

insufficient government funding for necessary studies and a lack of pilot plants and research centres.

The section concludes with evaluations of the potential for new development or further development of a range of metallic and non-metallic mineral resources found in Jordan.

CHAPTER 2 INTEGRATED ENVIRONMENTAL MANAGEMENT: The second

effective, integrated environmental management. This is needed to protect water and air quality, to ensure sound management of wastewater, solid waste and hazardous wastes, to properly manage sensitive coastal zones and to ensure effective protection of public health.

PROTECTING WATER QUALITY*:* Integrated

management and protection of water quality is one of Jor sustainable development priorities. This section looks first at institutional, regulatory and standards issues, then at monitoring and data management, technological research and development and, finally, at needs for public awareness and education.

Water is a scarce commodity in Jordan. Each citizen is currently allocated 156 litres per day - one of the lowest in the Middle East and in the world. Water demand will outstrip exploitable resources by the year 2000. Water scarcity is a function not only of available quantities but also of the quality of this water. Scarcity is exacerbated by population growth, estimated at 3.5% per year. Population growth increases pressure on already limited freshwater resources, and generates greater waste, threatening water quality. Water management must focus on protecting and managing both water quantity and quality.

Trans-boundary water management issues are important because much of the water currently available to Jordan is shared with neighbouring countries. The quality of this water

behaviour. It needs protection and monitoring.

Institutions, regulations and standards:
and effluent standards are based on guidelines from the World Health Organisation, the Food and Agriculture Organisation of the United Nations and other international standards, including some from Europe and the U.S. This approach was perhaps inevitable in the short-term, but is inappropriate for the longer term. Jordan needs national standards adapted to local conditions

wastewater treatment plants were meeting their design performance standards by the late 1990s. Upgrading the effluent of the other ten plants is necessary to protect surface and groundwater resources.

Monitoring and data management: Several government and quasi-government departments carry out water quality monitoring in Jordan. Poor co-ordination among them reduces the efficiency of national testing capacities, duplicates efforts and dilutes responsibility.

Research and development: Little original applied research has focused

Several possible research programmes need to be carried out as national initiatives. Jordan needs to encourage and strengthen local research on quality issues such as salinity, local water quality standards for various users and epidemiological studies.

Public awareness and education

problems are insufficient, given the gravity of these issues. Complacency among the public and poor communications between planners and users contribute to this problem. Water conservation awareness campaigns have been launched in recent years, urging the public to use less water. Similar campaigns need to target government agencies, the private sector, academics, religious groups and the public media. These campaigns should talk about the consequences of declining water

quality, the need to protect freshwater from pollution and the need to avoid using high quality water in tasks where lower quality water can be used (e.g., industrial cooling, irrigation).

WASTEWATER MANAGEMENT:

This section considers wastewater

municipalities and industries.

Municipal wastewater management in Jordan needs to be improved by extending sewage services, promoting integrated wastewater management, maximising environmentally sound approaches to wastewater re-use and recycling and promoting environmentally sound wastewater disposal and treatment.

Environmental health problems associated with human liquid wastes have changed over the years. With rapid growth of urban centres, traditional methods of on-site disposal become unsuitable, in part due to their impacts on local ground water aquifers.

A cholera epidemic in 1980 heightened awareness of the risks involved in uncontrolled re-use of wastewater but also of the potential for using properly treated wastewater

sewage systems were introduced into in cities, where treatment plants replaced traditional cess pits. By 1997, sixteen municipal sewage treatment plants were treating about 70% of total wastewater. Despite these achievements, a number of issues remain to be tackled. 25% of olds (housing 50% of the population) remain unserviced. Systems in Greater Amman and elsewhere still need to reach unserviced urban centres, urban fringes and slums. Over 10% of households, mostly in rural areas, are without any type of sanitation. Many cases of water and food pollution occur every year, often caused by intrusion of sewage into water systems. Finally, raw sewage entering treatment plants is often highly concentrated, imposing operational problems and problems in re-use and disposal.

Integrated wastewater management: A high level of wastewater collection, treatment and re-use has been achieved in recent years . Yet some crucial issues remain unresolved, including the need for a national wastewater strategy with comprehensive goals and policies. The institutional structure lacks clear lines of authority and responsibilities and suffers from weak co-ordination and integration. Personnel management suffers from poor job descriptions, lack of incentives and training activities. The operation and maintenance of the wastewater collection system suffers from breakdowns. Failure to respond to these breakdowns effectively creates hazards and public health risks.

Recycling and reusing waste water: Re-use of wastewater is necessary because available water supplies

Over 80% of wastewater in municipal treatment plants is now used for irrigation, providing about 10% of total irrigation water.

Wastewater disposal and treatment: While waste minimisation is a key goal, released wastes still need to be treated and disposed of in safe and environmentally sound ways. Jordan has achieved a high level of sewage

treatment. Yet a number of issues still require attention. Many communities remain dependent on cesspool systems that have become inappropriate. Unplanned land use and scattering housing, industrial estates and other developments make it difficult to extend services and control health hazards. Effluent from treatment plants sometimes seeps into groundwater. A considerable portion of water used for irrigation is not clean enough for irrigation. Population growth and financial constraints have led to overloaded treatment plants.

Industrial wastewater: Industry is a -economic development and can also contribute to sustainable development with more efficient production processes, pollution prevention strategies, cleaner production technologies and waste minimisation. Clear environmental criteria and guidelines are needed to guide the siting and to assess the environmental impacts of industries.

Pollution prevention and control in industry: Pollution control can be expensive and complex to regulate. Reducing pollutants before they enter the environment reduces risks and the costs of regulation and clean up. Cleaner production can improve the competitiveness of an enterprise, improving its efficiency while protecting its personnel and the environment.

Environmental management by industry: Two key tools for helping industry comply with environmental laws and regulations are environmental impact assessment (EIA) and environmental auditing. EIA techniques help integrate environmental considerations into project design. EIA carried out early in project planning can help first to evaluate alternative sites, processes, raw materials and other design options and later to identify suitable means for mitigating effects. Auditing is a systematic evaluation

regard to environment, safety and health. It is a voluntarily, pro-active and preventive approach that benefits industry and the environment.

MANAGING SOLID WASTE:

to minimise solid waste generation, maximise environmentally sound re-use and recycling of solid waste, promote environmentally sound solid waste disposal and treatment and extend waste services.

Solid waste generation in Jordan is increasing with population growth, industrial development and new consumption patterns and life-styles. Local governments and common services councils are responsible for solid waste management but they are hindered by lack of money, skilled manpower and community awareness.

Minimising municipal solid wastes: Per capita solid waste generation in Jordan is relatively high at 0.9 kg per day. Municipal solid wastes will increase, imposing a heavy burden on waste disposal sites. Most sites will soon be exhausted, including the Russifeh landfill site currently serving 2,250,000 inhabitants. Selecting and managing new disposal sites in an environmentally sound manner will increase the cost of solid waste handling and disposal. The focus should be on reducing the generation of wastes and on

changing production and consumption patterns.

Maximising waste reuse and recycling: Solid waste managers will need to promote re-use and recycling to help reduce volumes of waste consigned to disposal sites. Sorting different types of solid waste at source will be essential to facilitate recycling and reuse. This is not yet done in Jordan and considerable amounts of recyclable materials are wasted.

Promoting environmentally sound waste disposal: There are environmental concerns at all

The design and operation of most (if not all) current sites are environmentally unsound. The impacts of these sites on groundwater, air quality and other environment components raise serious public health concerns. Disposal is by open dumping at most sites, which are not lined to prevent seepage into ground water. Some sites receive sludge from wastewater treatment plants, medical and / or industrial hazardous waste and other industrial waste.

Extending solid waste services: Safe solid waste collection and disposal are crucial for protecting public health. Solid waste collection is provided to about 75% of Jordanians and more than 90% of Greater

is to extend this to all people.

MANAGEMENT OF HAZARDOUS WASTES: This section reviews the needs to promote utional capacities for hazardous waste management, to minimise the generation of hazardous wastes, to strengthen information exchange on hazardous substances and chemical risks, to promote and strengthen international co-operation in managing trans-boundary movements and preventing illegal traffic of hazardous wastes and to ensure safe, environmentally sound management of radioactive wastes.

Jordanians need to understand the negative health impacts of certain chemicals present in their environment. This is necessary for effective management of hazardous wastes. The proposed objectives are to minimise the generation of hazardous wastes and to ensure

those that are generated.

Strengthening institutional capacities for hazardous waste management: There are little data about the quantities and types of hazardous materials disposed of or the locations where they are dumped. There are no licensed sites for proper disposal of hazardous wastes, no efforts to estimate the extent of contamination caused by improper disposal and no proposals to clean up contaminated sites. No agency is able to provide the public or specialists with information on hazardous chemicals. There are no comprehensive regulations or standards or clear government responsibilities related to managing hazardous chemicals. Existing norms for treating and disposing of hazardous wastes are widely violated.

Monitoring programs need to determine the extent of hazardous chemical contamination and its effects on public health. Emergency plans are needed in case of hazardous chemical spills or

accidents. Awareness programmes should educate the public on hazardous wastes.

Personnel trained in hazardous substance handling, transporting, treatment and disposal are insufficient. No substantive research is conducted in this field in Jordanian institutions.

Minimising and preventing hazardous wastes: Managing hazardous substances is costly, so their minimisation needs to be a top priority. Technologies and resources currently available for hazardous waste management in Jordan are insufficient. Knowledge and information on the economics of hazardous waste prevention and management are lacking and there have been no significant efforts to change industrial processes or consumption patterns.

Exchanging information on hazardous substances is necessary to ensure sound management of hazardous chemicals. For example, the use of some hazardous substances has been banned in countries producing them. Available information is inadequate for ensuring the safe use, control, distribution, storage, formulation and disposal of restricted chemicals.

Strengthening international co-operation in managing trans-boundary movements: Criteria for identifying hazardous wastes and procedures for managing their movements need to be harmonised. Jordan needs monitoring systems and programmes to ensure careful control of trans-boundary movement of hazardous chemicals.

Sound management of radio-active wastes: Jordan uses nuclear technologies in many sectors. Radioactive wastes from these applications need stringent disposal measures. Plans are underway to construct a nuclear reactor. Nuclear programs in neighbouring countries present risks of accidents and a national emergency plan is needed. Monitoring programs need to determine radiation levels all over the kingdom, especially adjacent to Israeli reactors.

Jordan needs personnel trained to handle, transport and manage nuclear substances. Specifications and standards to regulate radiation levels from electrical and electronic devices and from wastes in the work environment are also needed. Finally, awareness programmes should educate the public on handling radioactive waste and responding to radiation accidents.

AIR QUALITY CONTROL: This section looks at needs for an ambient air quality monitoring & assessment network, national air pollution control and abatement, preparedness and emergency plans, and global commitments in the field of atmospheric protection.

Emissions of five principle pollutants - particulate matter, sulphur dioxide, carbon monoxide, nitrogen dioxide and lead - have all increased significantly in Jordan in the past two decades. The Environmental Law provides a framework to protect air quality and describes the role of the GCEP in the field of air quality protection.

An ambient air quality monitoring & assessment network is needed to ensure compliance with or progress

towards meeting air quality standards. It can observe pollution trends and provide a database to support applied research, urban management and land-use and transportation planning. The network can also help develop and evaluate pollution abatement strategies and diffusion models. At the moment, co-ordination is lacking among the institutions involved in air quality monitoring and assessment. Monitoring lacks continuity and coverage of the country is incomplete, while air quality has deteriorated severely in many parts of the country.

Air pollution control and abatement: Thermal power plants, oil refineries and the Khirbet Al-Samra wastewater treatment plant all

air pollution. Vehicles are a major source of air pollution in Amman and other major cities. Phosphate mining, quarrying activities and the cement industry all contribute to elevated dust levels. The iron and steel, chemical and tanning industries also contribute to atmospheric pollution.

Comprehensive national emergency planning and preparedness are needed. Hazards and the risks they pose for communities are poorly understood at the moment.

Global commitments: Jordan has signed several global agreements on ozone layer protection. Jordan's consumption of ozone depleting substances is estimated at 1000 tones/year, or a per capita consumption of less than 0.3 kg / year.

COASTAL ZONE MANAGEMENT: This section discusses coastal zone management in the Gulf of Aqaba and Dead Sea regions.

The Gulf of Aqaba needs integrated coastal zone management, better control of urban pollution and effective plans to deal with emergencies.

coastline supports a highly diverse marine environment as well as industry and tourism, which compete for and impact upon the marine environment. The city of Aqaba has changed from a quiet fishing village to a busy port of 70,000. Industry, tourism and transport have brought economic advantages, but also adverse impacts on the environment, natural resources and the population.

The Gulf of Aqaba is semi-enclosed, contributing to its globally significant bio-diversity and unique marine ecosystem, but also limiting water exchange with the Red Sea. Low potential for dispersing oil and other contaminants is an acute lopment has brought threats to the marine environment such as phosphate dust, industrialisation and port development. The Aqaba Regional Authority alleviates some of these problems, but continued efforts and better co-ordination are needed from institutions managing the marine environment.

Aqaba city will continue expanding and all its development activities will have environmental effects that can adversely effect public health. Key issues will be related to expansion of urban infrastructure, including roads

and the expansion of tourism facilities.

There are also many hazards and risks, but no comprehensive emergency plan. Understanding of hazards (such as oil spills) and the risks they might pose is limited.

The Dead Sea region is unique and needs integrated planning and

rich natural and cultural heritage.

The Dead Sea is highly saline, with a unique topography it is the lowest place on earth. Lack of funds may slow its development while its fragile environment may not sustain the ambitious plans of developers. Salt extraction at the south end of the sea is economically important and

water and mud also has economic potential. Finally, there is considerable tourism potential, though the east shore of the sea remains relatively poor and underdeveloped.

master plan for the Dead Sea region accommodates proposals by the private sector. The plan foresees construction of 15,000 rooms and 18,000 housing units on a sixty kilometre stretch of sea shore by the year 2010, with further development projected for the Suwimeh area.

The development needs of the local population and the need for sustainable resource use must be reflected in development plans. Water and sanitation services to be developed, for example, should meet the needs of the local population.

heritage and natural beauty will need to be carefully protected during construction and operation.

PUBLIC HEALTH: This section discusses primary health care needs, control of communicable diseases, protection of vulnerable groups, meeting urban health challenges and reducing health risks associated with environmental pollution and hazards.

imary health care centres meet the needs of urban and rural dwellers. Scarcity of fresh water is the major environmental health concern, yet Jordan has been able to control most of its infectious diseases and boasts good health indicators compared to other developing countries. Rapid industrialisation is now bringing new health problems associated with changing lifestyles, increased pollution and exposure to toxic chemicals.

*Meeting primary health care needs: C*onsiderable progress has been achieved in recent years in primary health care. Almost 1100 primary health care centres served the country by 1995. Inadequate geographical distribution of health centres remains a problem though, with the Amman-Zarqa area under-served compared with the rest of the country. The efficiency of health centres also needs to be improved. Better qualified personnel and better facilities are needed at some centres. The existing health information system needs upgrading.

Control of communicable diseases: Environment-related infectious diseases are a major health issue, especially in rural areas and slums. Their control depends largely on the availability of safe drinking water, proper sanitation and waste disposal

practices. Control of disease vectors and immunisation programs are also key factors. Overcrowding and indoor air pollution encourage the spread of acute respiratory infections, a major cause of death among young children.

Protection of vulnerable groups:

under the age of 14. Falling infant mortality rates - from 151 / 1000 births in 1961 to 28 / 1000 births in 1994 - are attributed to improved health services and more educated mothers. But the health of children remains vulnerable to various environmental factors. A declining fertility rate (5.6 births per women in 1991 to a projected 4 per women by the year 2005) can be attributed to improved educational and job opportunities for women.

Migrants in refugee camps and slums generally lack proper housing, health services, sanitation and safe drinking water.

Urban health challenges: Rapid urban growth has overtaxed capacities of health services to meet local needs and exposed the population to environmental hazards. Pollution, overcrowding and inadequate housing all contribute to health problems in urban areas.

Reducing environmental risks: Pollution control, prevention and protection measures have not kept pace with the rapid industrialisation and urbanisation of recent years. Respiratory diseases and other health problems among workers can be attributed to unsafe conditions and poor indoor air quality at the workplace. Uncontrolled dumping of industrial wastes and toxic chemicals in remote areas and in sewers threatens the environment and public health. Re-use of treated domestic and industrial wastewater can lead to problems if not properly controlled and monitored. Improper disposal of hospital waste can be a major health hazard. Lack of awareness about potential health risks and environmental hazards associated with use of chemicals can lead to chemical accidents and poisonings in industry, agriculture and in homes.

CHAPTER 3 NATURAL AND CULTURAL HERITAGE: This

and cultural heritage resources and their sustainable development needs.

NATURAL HERITAGE: Jordan has a rich diversity of plant and animal species.

Plant bio-diversity: A number of

done, but much research is still needed for flowering, non-flowering and nonvascular plants. Many plant species are threatened with degradation or extinction due to both man-made and natural factors. Serious attempts have been made to

genetic resources and many reserves have been established. Yet the laws and regulations governing them are not always enforced.

Actions needed to help conserve, protect and sustain Jordan's plant genetic resources include scientific assessment of species, research into different facets of plant bio-diversity, enhanced public awareness of important plant species and implementation of conservation laws.

Detailed ecological studies of

There are few studies, for example, on the economic or medicinal values

forest ecosystems need more research especially regarding seed germination, forest regeneration, species density, coverage and distribution, and causes of forest destruction.

Reserves are needed to protect rare and endangered species in areas with fragile ecosystems. A national botanical garden is needed to conserve wild natural plant resources and maintain the gene pool of wild plant species. Research is being done to propagate and conserve some species of rare and endangered plants. Surveys and experiments to propagate and cultivate other threatened species are also needed.

Legislation should support conservation and protection of biological diversity. For example, hundreds of plant specimens are removed from the country illegally each year, including many rare, endemic and previously unknown species. Top priorities include clear rules and laws controlling genetic resources, shared benefits from using genetic resources, an office to permit collection and handling of genetic resources, strict rules controlling threats to plant bio-diversity and a more important role for reserves.

Animal Bio-diversity: Protection of animal bio-diversity through conservation of rare and threatened species and habitats is closely linked with quality of life in Jordan. Yet the concepts of conservation and sustainable use of bio-diversity are still not clear for most Jordanians. These concepts need to be integrated into the policies of all major socio-economic sectors. Conservation targets will only be achieved with clear action or recovery plans, based on current scientific knowledge, specifying conservation targets and actions needed to achieve them.

The introduction of modern vehicles and automatic weapons after 1900 led to the extinction of some species. These problems increased with the rapid population growth caused by the Arab-Israeli conflicts. Other problems for conservation of wild animal species include illegal hunting, degradation of forests, lack of management in recreational areas, loss of wetlands, lack of public awareness, lack of specialised scientific centres and weak legislation.

Available data on livestock bio-diversity in Jordan are inadequate. Yet it is clear that several breeds of domestic animals and birds have decreased, and some have disappeared, as a result of environmental and human factors.

Animal products and by-products available in Jordan have not met increasing domestic demand and imports have risen as a result. Productive breeds have been imported, affecting local breeds. Local breeds have social and cultural value and some have unique attributes for adaptation, disease resistance and specific uses that need to be preserved. Introduction of exotic breeds and of changes in livestock production systems threatens them with extinction.

CULTURAL HERITAGE: The

resources considers archaeology and

tourism, as well as the needs for a national strategy for archaeological research, for local communities to participate in managing heritage resources and for greater public awareness and strengthened legislation related to cultural heritage issues.

Destruction of cultural heritage resources, like environmental degradation, is a global problem calling for the combined efforts of the international community. Threats to cultural heritage come from several sources, including illicit trade in antiquities, haphazard development and growth and general public apathy. The result is the irretrievable loss of cultural resources.

huge economic contribution through tourism: Most tourists visit Jordan to enjoy its cultural heritage, and tourism contributed more than 11%

exchange brought in by tourists in 1994 exceeded US$ 650 million or

merchandise exports in that year. But tourism puts pressure on archaeological sites, particularly the city of Petra. The most effective way to reduce this pressure while maintaining growth in tourism is by diversifying tourist attractions. Tourists will remain attracted mostly

important to preserve these sites.

Need for integrated planning and management: The national and regional bodies responsible for

carry out integrated planning and co-ordination, management and land-use plans. Clear decision-making mechanisms and clearly defined authorities among responsible government institutions are also needed. Legislation on the roles and responsibilities of the Department of Antiquities and other national and regional government entities involved in cultural resource preservation urgently needs to be reviewed to resolve inconsistencies among authorities and mandates.

A clear strategy is needed for building capacities of the institutions and people responsible for cultural resources. Financial and administrative constraints and limited technical expertise impede conservation of cultural resources. The government institutions and NGOs involved in the protection of architectural heritage need to be evaluated and enhanced.

Strategy for developing and protecting heritage sites: The

strategy should include development and protection of archaeological and cultural sites, supported by proper laws. The roles of local governments, municipalities and local councils need to be clearly defined. A new strategy for investing in tourism should be developed. Proper training and capacity building of related bodies will be essential to enhance local decision-making capacities and to ensure satisfaction of the needs and aspirations of local communities, local governments and the central government.

CHAPTER 4 LEGISLATIVE AND INSTITUTIONAL ISSUES FOR SUSTAINABLE DEVELOPMENT: This chapter discusses the needs to formulate new laws and regulations in support of sustainable development, as well as

strengthening or improving enforcement of existing ones. It also discusses the need to strengthen the General Corporation for Environmental Protection. A proposed national system for Environmental Impact Assessment is attached as Annex 1.

Jordan needs clear and effective laws and regulations to support emerging sustainable development strategies and policies. A wide range of issues should be considered in developing these laws and regulations. Enforcing these laws and regulations will be crucial for transforming sustainable development strategies and policies into action.

Jordan has developed some notable legal instruments in support of sustainable development in recent years, such as the law for Environmental Protection No. 12 (1995).

LAWS AND REGULATIONS IN SUPPORT OF SUSTAINABLE DEVELOPMENT: In the past ten years Jordan has tried to integrate its legislation on environment and development to better promote sustainable development. Yet most socio-economic development plans still do not pay serious attention to sustainability issues or the need for integrated development approaches. For example, Jordan has formulated a number of economic laws and regulations in recent years to promote investment and economic development and respond to the -economic circumstances. The requirements and principles of sustainable development have been given little or no consideration in most of these laws and regulations.

Science and technology have important roles to play in support of sustainable development. These roles should be promoted actively with appropriate legal (and economic) instruments.

To date Jordan has established one principal environmental law and this law now needs to be applied through the development of the necessary by-laws, directives, and other legislative

environmental law also needs to be effectively reconciled with other national laws dealing with environmental issues. The institutional framework for environmental protection in Jordan also needs revision.

to sustainable development need to reflect the principle of integrating environmental protection with socio-economic development in a more comprehensive way. This will require improving and adjusting existing legislation aimed at promoting sustainable development and introducing new legislation focused on increasing the sustainability of Jordanian economic and social development policies and programmes. Local legislation also needs strengthening to ensure sustainable development principles are effectively integrated into local development strategies, policies and programmes. Finally, there is a need to ensure that Jordan is in accord with international norms and practices in developing legislation, technical regulations and standards related to sustainable development.

ENFORCING LAWS AND REGULATIONS: The value of laws and regulations in support of sustainable development will depend

on their actual enforcement. Jordan needs to address a number of challenges related to the enforcement of the law for environmental protection.

STRENGTHENING AND ACTIVATING ENVIRONMENTAL LEGISLATION: Jordan has a National Environmental Strategy, a National Environmental Action Plan and its first law on the environment - the Law for Environmental Protection (1995). The General Corporation for Environmental Protection (GCEP) is responsible for overseeing the implementation of the law. For a number of reasons, the enactment of this law and the establishment of GCEP have not had much effect on environment management in Jordan to date. The

capabilities, for example, do not meet the requirements of its mandate and the law has certain defects. The mechanisms for activating the law are vague and weak and there is no clear systematic legal mechanism for its enforcement. The activation of the law has been slow, partly as a result of the slow process of enacting the by-laws and regulations needed to enforce it.

STRENGTHENING AND EMPOWERING GCEP TO FULFILL ITS MANDATE: The GCEP needs strengthening, particularly to ensure its ability to properly enforce the Law for

management and data processing systems need upgrading, as well as their systems for exchanging information both within GCEP and between GCEP and its partner organisations in Jordan.

CHAPTER 5 EDUCATION AND AWARENESS: This chapter

promoting environment and sustainable development education among different target groups, promoting integration of sustainable development issues within human resource development programmes and promoting greater awareness of sustainable development issues. The

National Strategy for Environmental Education, Awareness and Communications.

PROMOTING ENVIRONMENT AND SUSTAINABLE DEVELOPMENT EDUCATION: Efficient and consistent use of advanced scientific and technological knowledge in many disciplines is needed to help Jordan move towards more sustainable development. New knowledge and new technology requires new curricula for environment and sustainable development education.

Environment and sustainable development education at universities:
should play a lead role in sustainable development education and in supporting research into both preventive and remedial solutions to sustainable development problems. University students in all disciplines need
key environment and sustainable development challenges and options.

Improved co-ordination and harmonisation with regard to environment and sustainable development education is needed among the different universities and at lower levels.

Few authorities are currently able to provide specialised information about different sustainable development issues and options of interest for Jordan. There is also a shortage of adequately trained personnel. For example, most Jordanian specialists lack the experience and skills needed to work well in multi-disciplinary teams.

No substantial environment or sustainable development research being is carried on by Jordanian institutions and there are no doctoral programs in related areas. There is a need for partnerships between our universities and international institutions to facilitate the transfer of up-to-date knowledge and expertise.

Public sector environmental education: All students at the basic and secondary stages should be made aware of environmental problems and related laws and regulations, ethics and responsibilities. Environmental education needs to focus on issues like the need to protect natural resources, the nature of local and regional environmental problems and specific relevant issues such as integrated pest management, population problems and their relationship with environmental degradation. There is also a need to encourage changes in consumption patterns and greater participation in local and regional environmental projects and in decision-making processes in general.

Non-formal environmental education: The process of non-formal environmental education (NFEE) provides people with functional environmental knowledge, awareness, and skills. NFEE helps bring about fundamental shifts in attitudes and new commitments to cleaner and more efficient ways of doing things. NFEE focuses on people from all walks of life and age groups and can be done by the school system, NGOs, institutions, businesses, foundations and the private sector. NFEE provides the information, skills and technologies needed to address the most urgent environment and sustainable development challenges facing Jordan.

PROMOTING INTEGRATION OF SUSTAINABLE DEVELOPMENT ISSUES INTO HUMAN RESOURCE DEVELOPMENT: Jordan has considerable capacity for training government, private sector and NGO staff. This capacity needs strengthening. The King Hussein Environmental Training and Management Program offers a model, focusing on human resources development in environmental impact assessment, environmental audit, environmental law and public awareness. Other training centres can be upgraded to integrate sustainable development issues into their curricula and training activities. The Vocational Training Centres, for example could focus on integrating ecological considerations at the management level.

Training programmes: Environment and sustainable development issues are ignored in most training programs. Their integration into sectoral training programmes is impeded by poor co-ordination among training institutions and programmes. Where environment and sustainable development training does exist, it suffers from financial constraints, lack of independence, bureaucratic laws and regulations

and institutional weaknesses, including lack of systematic monitoring and follow-up. NGOs are a focal point for many women in Jordan and if NGOs had the technical skills they could play a major role in planning and implementing training programmes.

PROMOTING AWARENESS OF SUSTAINABLE DEVELOPMENT ISSUES: *T*he law alone cannot protect the common interest. This also requires the support of informed communities. Public media need to communicate the necessary information to these communities. Protecting the common interest requires a high degree of public participation in decisions that affect the environment. This can be achieved by making communities aware of their environment and by giving them effective say over the use of the resources they depend on.

Individuals need to be persuaded to act in the common interest. Effective participation in decision making in communities helps them articulate and protect their common interests. Media can support communities by providing timely, unique access to the public and special groups allows them to make their options and make informed decisions. Constraints to raising public awareness include limited technology and expertise available inaccurate and insufficient information available to the public and journalists, lack of training to support awareness campaigns, little sense of personal responsibility for environmental issues, lack of continuity and money needed for awareness campaigns.

To carry out awareness campaigns effectively, journalists need training on the issues, access to information, opportunities to participate in the sustainable development processes, communication plans targeting specific groups and, especially, personal commitment.

CHAPTER 6 SOCIO-ECONOMIC ISSUES: This chapter considers some key socio-economic challenges linked with sustainable development in Jordan: combating poverty, population planning, changing consumption patterns and issues related to youth, children and women.

COMBATING POVERTY: Poverty is reflected in poor nutrition, low life expectancy, imbalance between income and necessary expenditures and high levels of infant mortality. The most severe poverty in Jordan is found among the urban poor (especially squatter areas), refugee camps, and remote rural areas. The urban poor often lack adequate access to health, water, sanitation, and other basic services. It is necessary to provide all Jordanians with opportunities to earn sustainable livelihoods. An integrated strategy is needed for poverty stricken areas.

awareness and understanding of sustainable development issues.

National environmental awareness and communication program: It is very important to raise public awareness of environment and sustainable development challenges, and of the options for addressing these challenges. Institutions, firms and individuals all need to be encouraged and helped to evaluate

YOUTH IN DEVELOPMENT:

population. They need a role in protecting the environment and in decisions on environment and development. Problems facing

unemployment and poverty, rising drugs use, lack of institutions and activities meeting the needs of youth, lack of information and awareness programmes about health and environment and early marriages that put extra economic pressures on youth.

FOCUSING ON CHILDREN: Commitment to the care and protection of children is deeply rooted in Jordanian culture and society and remains at the forefront of the national agenda. This is reflected, for example, in the universal immunisation coverage against the six killer diseases, provision of education for all, and ratification of the convention on the Rights of the Child. Many problems facing children in Jordan today are due to recent economic stagnation. Declines in family incomes lead to

hygiene and education levels. There is a growing phenomenon of children between six and eight years on the streets to earn money to sustain their families. Child labour, though illegal, exists in Jordan. Child abuse is thought to have increased due to the economic stress endured by poor families.

WOMEN IN SUSTAINABLE DEVELOPMENT: Women need to participate more in defining policies and programs for sustainable development. It is very important to ensure a gender perspective is integrated into the policies of all socio-economic sectors. Yet

decision making and planning related to the use and management of resources and protection of the environment for example, is minimal, in spite of the increasing of percentage of educated women. Environmental awareness programs relating to the use of and exposure to agricultural pesticides and herbicides are not directed at rural women, who are nevertheless major users of these products. Women bear primary responsibility for child rearing and many are also basic education teachers. They could ensure positive attitudes and behaviour towards the environment among children and youth. Training can help women heads of households to adopt environmentally sound income generating activities. The existing NGO network working with women should be provided with the knowledge and skills they need to help them raise environmental awareness.

POPULATION PLANNING:

rapidly in the past forty years leading to unbalanced utilisation of natural resources, increased environmental pollution and
rapid urbanisation. A high percentage of the population is young, economically dependent and attending educational institutions. Unemployment is rising among new entrants into the labour market and demand for basic social amenities is rising rapidly. There is a widening gap in income distribution and growing poverty.

CHANGING CONSUMPTION PATTERNS: Over-consumption by certain segments of society also

negatively effects the environment and needs to be addressed.

CHAPTER 7 INFORMATION FOR DECISION MAKING: This chapter has been prepared by many of the same specialists who prepared

Information Strategy (provided in Annex 2), which complements and supplements the chapter.

Accurate and timely information is a powerful tool for sustainable development, where everyone is both a user and a provider of information. Decisions at all levels need to be based on sound information. The -

technologies but the information underlying these technologies. The relative positions of nations, groups and individuals within societies will be determined to a large extent by their capacities for collecting, organising, analysing, distributing, protecting and using information.

Information is pervasive in nature and touches every aspect of human activities. It is characterised by strong interaction and interdependence among different sectors. Changes in the way information is handled in one sector affects other sectors. The co-ordination of information-related activities across all sectors of the Jordanian economy must be a collective effort at the national level.

Jordan needs increased collection of data relevant to sustainable development, improved co-ordination among information management activities, improved methods for data analysis and assessment (including indicators of sustainable development), transformation of existing information into forms more useful for decision-makers, proper mechanisms to permit efficient and harmonised information exchange, procedures for documenting and sharing available information and development and facilitation of electronic networking capabilities.

Problems include inadequate information management, lack of awareness of the value and availability of information resources, lack of financial resources and trained personnel needed to effectively manage information and lack of the technology needed to access information.

Access to and management of

environment, and on current trends and policies related to its sustainable development, are highly problematic. Much information exists in the

universities, research centres and other institutions. Yet these institutions find it difficult to make this information available to others.

CHAPTER 8 PROJECTS: This chapter summarises priority projects needed to promote sustainable development approaches in water resource management, agriculture, energy, environmental management, bio-diversity protection and tourism.

WATER RESOURCE MANAGEMENT PROJECTS: The following projects are considered the highest priorities for promoting sustainable water resource management in Jordan:

- Water resources assessment projects,

- Water feasibility studies,
- Rehabilitation of water distribution to urban areas,
- Construction of a national water carrier,
- Water desalination project,
- Wastewater treatment and networks projects,
- Projects to augment water supply,
- Institutional restructuring projects,
- Human resource development project,
- Irrigation network and canal improvement projects,
- Water importation, and
- The Red-Dead canal.

AGRICULTURE PROJECTS: The following projects are considered the highest priorities for promoting sustainable agriculture in Jordan:

- Management of crop, water and nutrients needs under different soil -water regimes,
- Soil management under irrigated and rain-fed conditions,
- Re-use of treated waste water in agriculture,
- Improving local livestock by artificial insemination and embryo transfer,
- Integrated pest management,
- Introducing new crops of high gross margin,
- Recovering animal feed from plant debris,
- Certification program,
- Upgrading of the agricultural labour force,
- Water spreading in Marab,
- Re-structuring of agricultural research activities,
- Disease-free repositories for fruit crops, and
- Introducing drought and salt-resistant crops.

ENERGY SECTOR PROJECTS: The following projects are considered the highest priorities for promoting sustainable energy production and consumption in Jordan:

- Oil shale utilisation,
- Renewable energy,
- Fossil fuel exploration, and
- Geothermal plants.

ENVIRONMENTAL MANAGEMENT SECTOR PROJECTS: The following projects are considered the highest priorities for promoting environmental management in support of sustainable development in Jordan:

- Studies on the composition and characteristics of solid waste to provide technical data for recycling and public awareness program on recycling,
- Recycling of organic and inorganic wastes in the Amman-Zarka area,
- Soil and water investigations at the land fill disposal sites,
- Incineration plants for solid wastes in the Amman-Zarqa area,
- Management of agricultural plastic waste,
- Bio-gas extraction from organic wastes,
- Control of noise pollution,
- Capacity building of environmental health laboratories and services,
- Upgrading of health information system,
- Strengthening of occupational health safety measures,
- Encouraging and strengthening environmental epidemiology research,
- National air pollution monitoring network,

- Indoor air quality monitoring, and
- National network of healthy cities and villages.

BIODIVERSITY PROJECTS: The following projects are considered the highest priorities for promoting conservation of biological diversity in Jordan:

- General herbarium,
- National botanical garden,
- Geographical distribution and monitoring of rare, endangered and threatened species, populations and ecosystem,
- In-situ and ex-situ conservation of genes, species, population and ecosystems,
- Bio-diversity training centre,
- Completion of the protected areas network,
- Enforcement of environmental legislation related to bio-diversity, and
- Regional environmental training centre.

TOURISM PROJECTS: The following projects are considered the highest priorities for promoting sustainable tourism in Jordan:

- Amman downtown tourism zone,
- Dead Sea panoramic complex,
- Madaba-Dead Sea park,
- Kerak tourism development,
- Petra region infrastructure development and environmental management,
- Wadi Ram infrastructure development and environmental conservation,
- Karak and Jarash tourism development pilot program,
- Sector development support,
- Creation of a national register of archaeological and cultural resources in Jordan,
- archaeological database information system,
- Jordan national museum, and
- Preservation and restoration projects at Qasr al Bint /Petra, Umm al Jimal, Qasr al 'Abd/Iraq, al Amir/ Amman, Umm Qays, Tabaqat Fahl (Pella of the Decapolis), Qusayr 'Amra and Historic Old Salt.

CHAPTER 9 LINKAGES FOR THE NATIONAL AGENDA 21: This chapter calls for a national partnership for sustainable development where all sectors will make social, economic and political commitments to ensure the transition to sustainable development.

Sustainable development requires partnerships based on broad coalitions of interest. Forming these partnerships will require more than just willingness and commitment; it will also require awareness and understanding. Concern for the environment needs to touch every sector, every community and every institution. The integration of environment and development should be reflected in a re-orientation of attitudes, in changes to decision-making processes and in modification and strengthening of institutional arrangements at national

Agenda 21 will have to maintain links with NGOs, local communities, major development plans, the scientific and professional communities and the international community.

CHAPTER 10 MOVING FROM THE NATIONAL AGENDA TO LOCAL AGENDAS: This chapter looks at the need to begin initiating local sustainable development agendas in Jordan, focused on different areas of concern. It suggests guidelines and prerequisites for developing these local agendas.

INITIATING LOCAL AGENDAS IN JORDAN: Experience gained in

combined with growing regional and global experience in the development of local agendas, will be valuable for local agenda building in Jordan. Local agendas will need to be carefully co-ordinated with the national Agenda.

Local agendas can help communities and other groups enhance their understanding and awareness of their situations of the sustainable development challenges facing them and of the options available for addressing these challenges. Formulating local agendas can help communities and other groups discover their potentials, develop their capabilities, and tap available resources. Local agendas should be developed through participatory processes, using many of the same tools used to develop the National Agenda 21. Developing local agendas introduces communities and other groups to new approaches and skills, such as problem-solving techniques and communication skills, which can help them come to terms with the complex environment and development challenges they face.

AREAS OF CONCERN FOR LOCAL AGENDAS IN JORDAN: Local agendas 21 help define sustainable development priorities, strategies and options. A local agenda may focus on a certain location, such as a city, a watershed, a valley or an archaeological site, or it may be for a specific sector, such as water, agriculture, industry or education.

GUIDELINES FOR LOCAL AGENDAS: Guidelines and manuals reflecting Jordanian reality local concerns, constraints, opportunities and values will be an important part of promoting local agendas in Jordan. These guidelines and manuals can draw on valuable experience from countries like Morocco (where an increasing body of resource material is available in Arabic) and Turkey and on the expertise and guidance of organisations such as the International Council for Local Environmental Initiatives. Common elements that have emerged in most successful processes for developing local sustainable development strategies include partnerships, community-based issue analysis, action planning, implementation with careful simultaneous monitoring and effective evaluation and feedback mechanisms.

PRE- REQUISITES FOR LOCAL AGENDAS: A number of conditions will help ensure the

national Agenda 21 needs to be formally adopted by the government and a follow-up and monitoring unit for this agenda needs to be established. This unit can provide guidance and advice to local agendas, linking them with the national agenda. Another important condition is that the national government and international

agencies working with them

to move towards more sustainable development.

CHAPTER 11 MONITORING AND REPORTING ON IMPLEMENTATION OF The final chapter discusses the need to

Agenda 21, what kinds of monitoring and reporting are needed, how to do it and who should be involved.

WHY MONITOR THE IMPLEMENTATION OF The main reasons for monitoring

21 in the future will be to measure and report on progress being achieved, to strengthen participatory processes, to learn from experience

experiences with other countries.

WHAT KIND OF MONITORING AND REPORTING? Monitoring

or-

character, opportunities, needs and

Reports should be regular and timely, credible and objective, concise, easily understood and widely disseminated among national stakeholders. These stakeholders should be involved in gathering, compiling and analysing monitoring information. Subjective monitoring instruments such as case studies and interviews / questionnaires should be combined with monitoring of key indicators to provide a balanced picture of the evolving situation.

HOW TO DO MONITORING AND REPORTING? Monitoring and reporting should be rigorous and encourage learning from experience.

monitoring. Monitoring should be as simple as possible, not too standardised or too complicated, and not putting unrealistic demands on those responsible. A national Agenda 21 office should lead the

implementation and help ensure that monitoring information is used effectively.

WHO SHOULD BE INVOLVED? A national Agenda 21 office, together with principal stakeholders, should clearly identify the monitoring roles of each partner

Agenda 21, including government agencies, private sector organisations, NGOs and the Agenda 21 office itself. It will be important to ensure national stakeholders are fully involved in the both designing and carrying out this monitoring - this will help strengthen their ongoing participation in the national dialogue on sustainable development.

ANNEX 1 A NATIONAL ENVIRONMENTAL IMPACT ASSESSMENT SYSTEM: This annex summarises a proposed national environmental impact assessment (EIA) system for Jordan.

INSTITUTIONAL & ADMINISTRATION REQUIREMENTS: The first section of the annex identifies the institutional and administrative requirements of the proposed EIA system. It identifies the required personnel, including project co-ordinators, environmental researchers and an EIA director. The

functions of the different divisions and the scope of their work are summarised.

The next section describes the proposed procedures for carrying out EIAs. The first level of procedures includes initial filing, obtaining directives, scoping the key issues and preparing proposed terms of reference for any required environmental studies, for the approval of the GCEP. The next level involves carrying out EIA and preparing technical report, called an Environmental Impact Statement (EIS), to be reviewed by the GCEP. T
not the proposed development project can proceed. The last level is an environmental management plan (EMP) detailing the environmental management measures needed to ensure that the project will not exceed the environmental impacts predicted in the EIA. The project proponent is responsible for implementing this EMP.

There are several annexes to this section on institutional and administrative requirements. The first is the project information form to be completed by the proponents of all development projects prior to licensing. The purpose of this form is to determine whether or not the proposed development project is exempted from registration for environmental impact assessment.

The next annex is a list of those activities that are subject to EIA procedures and approval prior to any other licensing by public authorities. The different types of activities requiring an EIA are summarised, including various kinds of:

- energy production,
- chemical & pharmaceutucal industries,
- metallury & metal works,
- mining & quarrying,
- textiles, paper and leather industries,
- timber production & processing industries,
- food production & processing industries,
- rural development & agricultural projects,
- industrial park development and implementation,
- major urban development works,
- tourism development, infrastructure and improvements, and
- physical infrastructure development.

The third annex discusses scoping and terms of reference. Scoping is an important early step in EIA that identifies the important issues to be considered in the assessment and eliminates those that are not important, thus ensuring that time and money are not wasted on unnecessary investigations. The terms of reference set out what the EIA will cover (the scope of the EIA) and how it will be managed.

A final annex describes the required contents of an environment impact statement (EIS), including:

- executive summary
- introduction
- project description
- scoping of issues
- EIA methodology used
- assessment potential impacts
- conclusions and
- appendices.

DIRECTIVES FOR ENVIRONMENTAL IMPACT

ASSESSMENT AND ENVIRONMENT IMPACT STATEMENTS: The second section of the annex provides draft directives to guide EIAs in the food processing and mining and quarrying sectors. The proposed directives for each sector include first, general orientation and guidelines and second, additional information and instructions specific to the sector.

The orientation and guidelines sections describe how the

presented in the EIS and the nature of the information to be included. This must include descriptions of:

- the proposed activity and preliminary identification of probable sources of eventual pollution;
- any required site preparation and construction activities;
- a detailed description of the planned activity and preliminary identification of potential sources of pollution, such as handling of raw materials and finished products, energy use and transportation; requirements;
- any special risks or potential accidents;
- alternative approaches considered and how the final option was selected;
- the potential impacted by the fac
- the physical, human environme to be affected;
- the time horizon of the proposed activity;
- expected impacts on environment, including direct, indirect and cumulative or synergistic effects;
- proposed measures to mitigate impacts, including both siting of the facility and operative measures such as pre-treatment of liquid effluents, recycling of treated effluents, filtering gaseous emissions, management of solid waste and so on;
- a summary estimation of the financial implications of the mitigation measures to be taken;
- a brief reiteration of the key elements of the EIA;
- management plan; and
- appendices containing pertinent reference documents and data, additional information and sources, analyses, reports, maps, photographs, photo-interpretation, modelling results and so on that were used or referred to in the EIA.

EIA BY-LAW: The final section of the Annex is a proposed by-law on EIA. This includes definitions of the

requirements of the by-law, its scope and its implications.

Introduction

Introduction

NATIONAL SITUATION AND GLOBAL COMMITMENT

Jordan is a small, mostly arid country, highly dependent on its fragile environmental resource base. Ensuring that environmental resources water, soil, vegetation and so on - are used in a

urgent challenges.

Concerns related to environmental protection and resource management have figured in various Jordanian economic and

commitment to the principles of sustainable development was confirmed at the Earth Summit (United Nations Conference on Environment and Development) in Rio de Janeiro in 1992. Jordan embraced the principles and goals of the global strategy for sustainable development in the 21st Century which emerged from the Earth Summit - known as Agenda 21 - and pledged to create the necessary conditions for achieving sustainable development in Jordan. An action-oriented national Agenda 21 for Jordan presented in this document - has been prepared over the past three years in order to lay the groundwork

development in coming years.

NATIONAL EFFORT NEEDED

Achievement of the sustainable

National Agenda-21 will require a concerted national effort. The nation will need to initiate new political, social and economic partnerships and commitments to ensure the allocation of the essential means for a viable and sustainable future. These will include national capacity-building, the information and data necessary for decision making, new and improved institutional arrangements and legal instruments, science and environmentally sound technology for sustainable development and, of course, financial resources.

The integration of environmental and socio-economic development concerns in national sustainble development efforts will also need to be reflected in a re-orientation of attitudes, in changes in decision making processes and in improved systems for planning, implementing and monitoring all major initiatives in the country. Finally, this task will require not only leadership and financial commitment from both the government and the private sector, but also the vision, cooperation and work of every citizen.

NATIONAL CAPACITY NEEDED

transition to more sustainable development will depend to a large extent on its institutional and professional capacities. The country will need to build its domestic capacity to address a wide range of sustainable development challenges. These capacity building needs are described in considerable detail in the national Agenda 21 presented below.

National capacity building for sustainable development will need to address a number of key needs and concerns. For example, it will need to involve careful integration of Jordan's indigenous knowledge and cultural heritage with modern knowledge and technology. The country's ability to move towards a sustainable society will be determined to a large extent by our national capacity to make independent, equitable and well informed decisions. These decisions will need to be compatible with sustainable development principles. These decisions will need to reflect viable long-term strategies for addressing shared needs and priorities, choosing development options that reflect the

potentials and limits on the one hand, and the needs of the Jordanian people on the other hand. . Overall, this capacity encompasses the , organizational and institutional capabilities.

WHY A PARTICIPATORY PROCESS

WHO WAS INVOLVED?

through an extensive participatory process. The aim of this participatory process was to build national consensus, while also building national capacities and strengthening the sense of national

development agenda. All of these factors will help in achieving the goals of the national Agenda 21 over the longer term.

The national Agenda 21 was developed with contributions from over 50 Jordanian experts representing a wide range of specialties and drawn from both the public and private sectors. A list of names, affiliations, and areas of expertise of these experts is presented in annex 3. These people came from many government, non-government, academic, and private sector organisations and they provided expertise related to a broad spectrum of sustainable development issues and challenges facing Jordanian society today.

WHAT WAS THE PARTICIPATORY PROCESS AND HOW WAS IT CARRIED OUT?

National experts working on

into thematic working groups or task forces. Each working group started its work by selecting a team-leader and a co-ordinator. Each was further subdivided into working groups to deal with specific sub-sectoral issues. These task forces were also assigned the services of three national consultants to help facilitate their work. The national Agenda 21 office provided each working group with guidelines and generic terms of reference to guide their work.

The working groups started their work by discussing current issues and challenges facing their respective sectors. They then defined the priority actions necessary for dealing with these issues and challenges effectively in the future. The working groups met with each other regularly to discuss the progress of the work they were doing in their respective fields of expertise. The team leaders of all the groups also met regularly in order to discuss and analyse linkages among their areas of interest and to exchange experiences.

Each specific working group conducted its own workshop to achieve consensus amongst the members of the task force before discussing their results in a national workshop. This national workshop then brought together all members of all working groups in order to integrate all their work into the draft national Agenda 21.

Task-force members were then given three weeks following the national integration workshop during which they were asked to provide any pertinent suggestions and comments either on their own sectoral agendas or the national Agenda 21. All relevant comments generated during and after the workshop were then incorporated in the national agenda document.

The experts in the working groups also collected baseline information in their respective fields during the preliminary stages of their work. This information was incorporated into baseline reports, which have been collected into a single document which provides a comprehensive set of background, in-depth information to complement the final Agenda 21 document.

AGENDA 21

The work of all the national experts and their working groups has been integrated

i
Agenda 21. A certain amount of additional, related work, much of it done by the same Jordanian experts, is annexed to the national agenda (including a recommended national environmental impact assessment system ,
environmental education and awareness and for environmental information). And, as mentioned above, a separate document containing the detailed baseline reports prepared by all the Agenda 21 working groups complements the main document.

The Agenda is organised into three main sections. The first section reviews the key sustainable development challenges facing the country and the best ways to meet these challenges in the future. Issues are analysed, national objectives proposed and the concrete actions needed to meet these objectives are systematically defined. Much of the second section follows the same format in discussions of the key cross-sectoral issues and instruments available for facing these challenges in coming years. The third section discusses various aspects of implementation and follow-up including the key national partners who will need to participate in the

their prospective roles.

The first chapter in Section 1 reviews issues related to the integrated management of natural resources (Chapter 1) water resources, land resources, agricultural resources, energy resources and mineral resources. Chapter 2 looks at key issues associated with the integrated management of environmental resources water quality, wastewater management, management of municipal solid waste and hazardous waste, control of air quality, management of coastal zones and public health issues. Chapter 3 reviews issues associated with Jordan
cultural heritage..

Section 2 focuses on cross-cutting issues and instruments: Chapter 4 discusses the need for strengthening of legal instruments and institutional arrangements. Chapter 5 discusses key issues and necessary initiatives in the field of public awareness and education. Chapter 6 does the same for environmental information. The final chapter in this section (Chapter 7) looks at a number of cross-cutting issues associated with population growth, poverty and consumption patterns

The third section, on "Implemntation and follow-up", is shorter than the other two, but no less important. If the ambitious goals of the national agenda are to be attained, then they will require active long-term support not only from a wide range of government and non-government players, but also other important stakeholders such as industry and NGOs. The first chapter of the section (chapter 8) discusses priority sectoral projects. Chapter 9 discusses key partners for sustainable development. The last two chapters in this section talk not of existing tools and instruments which will need to be strengthened in the future, but of new approaches which will need to be developed. Chapter 10 discusses how Jordan can proceed with many local Agendas 21 to define the needs, priorities and sustainable development strategies of individual communities, unique regions (such as the Jordan Valley or the Gulf of Aqaba) and key socio-economic sectors (such as the water sector). The final chapter looks at the critical question of how Jordan can most effectively monitor and report on the implementation of the national sustainable development agenda in coming years.

THE LONGER TERM VALUE OF

itself is not

Agenda 21 process. The experience gained and lessons learned during the formulation of the national Agenda 21 will help in developing the tools needed for implementing the many activities on the agenda.

the exposure of national specialists and stakeholders (individually and collectively) to the themes and strategies of the global Agenda 21, the systematic and logical work

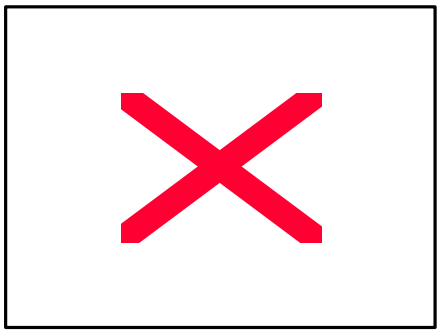
move to sustainable development

THE NECESSARY FOLLOW-UP TO

A concerted, sustained effort will be needed to ensure effective

21. A national Agenda 21 committee, representing government, NGO and private sector interests in a wide range of sectors should periodically review progress towards the goals of the national agenda, and review these goals themselves to ensure they

circumstances. This committee would need to be supported by a small Agenda 21 office (discussed in chapter 9).



Chapter One

Integrated Management of Natural Resources

1.1 WATER RESOURCES

I. INTRODUCTION

Jordan is considered generally a dry country due to the scarcity of its water resources, which is dictated by climatic conditions. It is classified as a low rainfall country and most of its land could be termed either arid or semi-arid. The average annual rainfall ranges from 600 mm per year in the northern highlands to less than 50 mm per year in the desert and southern Ghor.

Integrated water resource management is of paramount importance to Jordan

The total estimated available water from surface and groundwater is about 1,136 MCM, in 1995, of which about 747 MCM is surface water, and 389 MCM groundwater. With the exception of springs and King Abdullah Canal (KAC), surface water resources are at present used exclusively for irrigation. About 146 MCM of surface water are being stored behind the existing dams. Most of the municipal water supply systems and industry in Jordan presently depend upon groundwater and springs.

II. PROGRAM AREAS

A. INTEGRATED MANAGEMENT OF WATER RESOURCES

Basis for Action

Integrated water resource management is of paramount importance to Jordan. It is a prerequisite for the development of all socio-economic sectors. In the absence of a reliable evaluation of water resources potentialities, appropriate planning for sustainable development is a difficult task.

Promote a dynamic, interactive, iterative and multi-sector approach to water

The future of irrigated agriculture in Jordan is severely constrained by water scarcity. With current trends and policies unchanged, Jordan nonrenewable groundwater reserves will be exhausted in 50 years. By then, the country will have to depend exclusively on renewable water resources. Therefore, water demand management is an urgent policy option for Jordan.

Objectives

One. To satisfy the future needs in line with the national strategy of socio-economic development and the standard of living targeted within the natural and financial resources of the Kingdom.

Two. To find new methods to evaluate, develop and manage the water resources of Jordan.

Three. To establish strong and coherent institutional arrangements needed to ensure the efficient collection, storage, processing and analysis of hydrological data and the availability of data to potential users.

Four. To provide a scientific database for rational water resources utilization and to predict possible imbalances between supply and demand.

Five. To ensure sustainable yield of renewable groundwater aquifers.

Six. To improve networks to meet accepted standards for the provision of

Development of interactive data bases

data on water quantity and quality for surface and groundwater.

Seven. To protect existing resources from further degradation and improve efficiencies of water uses.

Eight. The management of water sources should integrate all the demand aspects of the resources including quality, economic values, unity of the managing institution and the legal framework. A successful management should achieve the following:

Promoting a dynamic, interactive, iterative and multi-sector approach to water management.
Planning for sustainable and rational utilization, protection, conservation and management of water resources.
Designing, implementing and evaluating projects and programs that are both economically efficient and socially appropriate.
Identifying and strengthening or developing, as required, the appropriate institutional, legal and financial mechanisms.

Activities

There are many options for minimizing, or managing the gap for future supplies. There are also some measures needed to create the enabling environment for the Ministry of Water and Irrigation or any water agency to perform effectively, to apply development priorities through tariff policies, legislation, standards, and enforcement procedure. The following activities were proposed :

1. **Integration of measures for the protection and conservation of fresh water sources**
2. **Development of interactive data bases**
3. **Optimization of water resources allocation**
4. **Implementation of allocation policies**
5. **Flood and drought management**
6. **Promotion of scientific research**
7. **Development of new and alternative resources of water such as:**

- **Supplying treated sewage effluent to meet industrial and agricultural demand.**
- **Recycling and reusing industrial wastewater.**
- **Using mostly surface water in the wet years to allow recharge of aquifers to be used in dry years.**

8. **National policies, with specific approaches, such as:**

- **Regulations regarding the use of water in rural and urban areas.**
- **Regulations regarding river pollution.**
- **Use and control of groundwater and inter-basin transfers.**
- **Applying the concept of cost recovery.**

9. **Improvement of community knowledge and behavior in using water, including rivers and wadis.**

The UNDP Funded "Strengthening of the National Capacity in Water Resources Planning Project" (JOR/92/007) has been instrumental in the establishment and development of a water information system database (FoxPro database software) for the Ministry of Water and Irrigation. The UNDP sponsored project has enjoyed strong associations and technical cooperation with USAID's sponsored Water Quality Improvement and Conservation (WQIC) Project and GTZ's National Water Master Plan (NWMP) Update Project. These

B. WATER RESOURCES ASSESSMENT

Basis for Action

Water resources assessment and monitoring are key issues in water resources development, management and planning. The planning and policy formulation for the utilization of water resources should be based on reliable assessment of these resources. Currently, there is a monitoring network for surface and groundwater resources, which consists of both manual and semi-automatic devices. Records show gaps, errors, and missing data due to malfunctions and/ or human errors in data collection or processing.

Objectives

Five specific objectives have been set accordingly, as follows:

One. To make available water resources assessment technology that is appropriate to

methods for the impact assessment of climate change on freshwater.

Two. To allocate financial resources to water resources assessment in line with the economic and social needs for water resources data.

Three. To ensure that the assessment information is fully utilized in the development of water management policies.

Four. To establish the institutional arrangements needed to ensure the efficient collection, processing, storage, retrieval and dissemination of information to users regarding the quality and quantity of available water resources at the level of catchment areas and groundwater aquifers.

Five. To have sufficient numbers of appropriately qualified and capable staff recruited and retained by water resources assessment agencies and provides them with the training needed to carry out their responsibilities successfully.

Activities

The Ministry of Water and Irrigation is upgrading the computer network and procedures used to store, process and analyze hydrologic data, in order to make such data and the forecasts derived from them available to potential users. The following activities were proposed :

1. **Establish databases on the availability of all types of hydrologic data at the national level.**

2. **Identify the need for water resources data for various planning purposes.**

3. **Analyze and present data and information on water resources in the forms required for planning and management -economic development, for use in**

Deterioration of both surface and groundwater resources is a major concern in Jordan

environmental protection strategies, and in the design and operation of specific water-related projects.

C. PROTECTION OF WATER RESOURCES, WATER QUALITY AND AQUATIC ECOSYSTEM

Basis of Action

Deterioration of both surface and groundwater resources is a major concern in Jordan due mainly to increased industrial activity, overexploitation and population growth. The avoidance of further deterioration of water quality and the ability to control the high consumption levels require serious action.

Objectives

Initiate effective water pollution prevention and control programs

One. Maintenance of ecosystem integrity, according to the management principle of preserving aquatic ecosystems, including living resources and of effectively protecting them from any form of degradation, on a drainage basin basis.

Two. Public health protection, a task requiring not only the provision of safe drinking water but also the control of disease vectors in the aquatic environment, and appropriate wastewater treatment.

Three. Human resources development, a key to capacity building and a prerequisite for implementing water-quality management.

Activities

1. **To identify the surface and ground water resources that could be developed for use on a sustainable basis. Programs for the protection, conservation and rational use of these resources on a sustainable basis should be initiated.**

2. **To identify all potential sources of water supply and prepare outlines on water protection, conservation and rational use.**

3. **To initiate effective water pollution prevention and control programs, based on an appropriate mixture of pollution reduction at source strategies, environmental impact assessments and enforceable standards for major point source discharges and high-risk non-point sources, commensurate with their socio-economic development.**

4. **To participate, as far as appropriate, in international water-quality monitoring and management programs such as the Global Water Quality Monitoring Program (GEMS/WATER), the UNEP Environmentally Sound Management of Inland Waters (EMINWA), the FAO Regional Inland Fishery Bodies, and the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention).**

5. **To reduce the prevalence of water-associated diseases.**

Full participation of women at all levels in sector institutions

Demand management may be less expensive, more sustainable and easier to implement than supply expansion

6. To establish, according to capacities and needs, biological, health, physical and chemical quality criteria for all water bodies (surface water and groundwater), with a view to an ongoing improvement of water quality.

7. To adopt an integrated approach to environmentally sustainable management of water resources, including the protection of aquatic ecosystems and living freshwater resources through:

- **Rehabilitation of polluted and degraded water bodies to restore aquatic habitats and ecosystems.**
- **Control of noxious aquatic species that may destroy certain other species.**
- **Conservation and protection of wetlands.**

D. DRINKING WATER SUPPLY AND SANITATION

Basis for Action

Water demand in Jordan exceeds the available renewable water supply, as a result, groundwater levels are declining and water quality is deteriorating. The present rate of groundwater abstractions cannot continue and must eventually be reduced by almost half. The efficiency of service delivery for both irrigation and urban water supply is very low.

The great proportion of renewable surface and groundwater resources has been utilized and exhausted. The remaining usable resources for future are gradually diminishing. The present water policy in Jordan includes elements of both supply expansion and demand management.

Demand management may be less expensive, more sustainable and easier to implement than supply expansion. The surface water forms 65% of the total available water resources. For this reason, the surface water should be managed carefully to support the groundwater resources, which are being exhausted.

Objectives

One. Protection of the environment and safeguarding of health through integrated management of water resources and of liquid and solid wastes.

Two. Institutional reforms promoting an integrated approach and including changes in procedures, attitudes and behavior, and the full participation of women at all levels in sector institutions

Three. Community management of services, supported with measures to strengthen local institutions in implementing and sustaining water and sanitation programs.

Four. Sound financial practices, achieved through better management of existing assets, and widespread use of appropriate technologies.

Activities

One. Create a comprehensive water quality monitoring system consistent with the resources management and regulations .

Two. Enforce water quality standards on the effluents of industrial and commercial units provided with water-use rights.

Full participation of women at all levels in sector institutions

E. WATER AND SUSTAINABLE URBAN DEVELOPMENT

Basis for Action

A very high percentage of the Jordanian population lives in the urban centers. The urban-related environmental problems cut across several water resources management issues, such as:

One. The introduction of sanitary waste disposal facilities based on technologies that are environmentally sound, low-cost and suitable-for-upgrading.

Two. Implementation of urban storm-water/ run-off and drainage programs.

Three. Promotion of recycling and reuse of wastewater and solid wastes.

Four. Control industrial pollution sources to protect water resources.

Five. Protection of watersheds with respect to depletion and degradation of their forest cover, and harmful upstream activities.

Upgrade and develop municipal networks to minimize unaccounted-for water

Objectives

One. To ensure that all urban residents have access to at least 100 liters per capita per day of safe water to satisfy the population needs and to sustain the health situation, that 75% of the urban population are provided with on-site or community facilities for sanitation.

Two. To improve the existing quantitative and qualitative discharge in the light of internationally acknowledged guidelines and in congruence with the national needs of the various socio-economic sectors and their sustainable development.

Three. To have ensured that 75% of solid wastes generated in urban areas are collected, recycled, or disposed of in an environmentally safe way.

Activities

1. **Progressively integrate the management of storage and primary water delivery systems so as to optimize the management of the total resources in a flexible and efficient manner.**

2. **Prepare systematic water audits and master plans for municipal systems.**

3. **, and to improve and extend the water delivery service in an efficient manner.**

In its attempts to adopt a progressive pricing system to secure the financial viability of water delivery agencies, the Government will:

4. **Enhance the existing block tariff system in urban areas so as to cover the O&M (operation and maintenance) costs of delivering municipal water services.**

5. **Regulate private water deliveries in urban areas consistent with resource management objectives and regulations of the quality of water used for drinking and domestic uses.**

F. WATER FOR SUSTAINABLE FOOD PRODUCTION AND RURAL DEVELOPMENT

Basis for Action

As a result of population growth in Jordan, improvement of standards of living, urbanization and industrialization, the demand on water by sectors other than agriculture has increased immensely. The agricultural sector today suffers from acute water scarcity. Encroachment of urban areas on agricultural land also reduces the area of rain-fed agriculture. These circumstances have adverse effects on attempts to achieve national food security.

The significant decrease in the amounts of water available to the agriculture sector makes it essential to consider all possible ways for the efficient management of irrigation water, the adoption of new water-saving technologies and the improvement of rain-fed agriculture. These can be achieved through human resources development, applied scientific research, participation and institutional interaction.

Other common problems facing the agriculture sector include soil erosion, inappropriate agricultural practices, financial and market constraints and inability to consistently deliver products in adequate quantities and quality.

Objectives

One. Management of water resources for agriculture must be developed to: (i) increase food production per unit volume of water (ii) improve human health (iii) improve the socio economic conditions of the rural population and (4) provide high level of food security at the national level.

Two. Groundwater resources should be considered as a finite resource having an economic value. Therefore, protection and conservation of groundwater resources should have high priority in the government policy when using this source for agriculture.

Three. Local communities shall be encouraged to participate in all phases of irrigation water management.

Four. Planning, developing and managing water resources for agriculture must be done in an integrated manner to meet present and future needs for agricultural production, taking into account environmental consideration.

Five. The development of new irrigation projects and the adoption of new technologies must be accompanied by an assessment of their environmental impact. Also, any new proposal should have the objective of increasing efficiency and productivity, with

the involvement of water-user groups.

Groundwater resources should be considered as a finite resource having an economic value

Activities

1. **Encourage cropping patterns that provide a high return on water or which make use of brackish water or treated wastewater, taking into account other constraints.**

2. **Promote modern irrigation techniques that achieve water savings on-farm while optimizing crop returns and farm incomes.**

3. **Reduce water losses in irrigation distribution systems by converting water conveyance from open canal to closed pipes systems.**

4. **Support research institutions to enhance their activities related to the determination of crop water requirements, irrigation water management and optimum water use.**

5. **Prepare soil and water conservation and water harvesting projects for different river and Wadi basins.**

6. **Carry out research on the impact of reusing treated wastewater in agriculture and on new approaches for treating wastewater.**

Establish the institutional capabilities for regulating and enforcing wastewater regulations

7. **Carry out research to assist the effect of recycled water on plants, soil, human health, and the environment.**

8. **Establish detailed legislation and standards that govern the reuse of treated effluent in agriculture without endangering public health.**

9. **Have farmers manage water distribution along the line, ending the need for farmers to confirm deliveries individually.**

10. **Ensure that effluent quality conforms to water quality standards for use in irrigation.**

11. **Provide training to farmers and JVA staff.**

12. **Support the appropriate use of brackish water for irrigation.**

13. **Develop data, information, and standards for the reasonable water needs of each economic activity.**

14. **Introduce abstraction penalties for groundwater as compensation for depletion or deterioration of the source.**

G. IMPACT OF CLIMATE CHANGE ON WATER RESOURCES IN JORDAN

Basis for Action

Air pollution in Jordan, and the contribution of Jordan to world emissions causing the greenhouse effect and global warming, are minimal. It is estimated that 12 million tons of gaseous fumes are produced by the power plants. An average of 575 tons/annum of chlorofluorcarbons (CFCs) is imported, of which 200 tons are re-exported in industrial products. This would amount to about 0.05% of total world consumption. As global warming scenarios for the next 50 years have been predicting a rise in global temperatures, this would result in a decrease in rainfall in Jordan with a disastrous impact on agriculture and water resources which

would also be experiencing demographic pressures.

In the long term, Jordan is likely to be confronted by a severe shortage in the basic natural resources, water, which could be overcome to some extent through increased regional cooperation. Environmental problems and issues in Jordan are dominated by the critical need to manage the scarce common resource of water and cultivate land more effectively to meet the growing needs of population. These factors make Jordan very vulnerable to the impact of potential future climate change. As a result, there is an imperative need for Jordan to develop new policies or adopt existing policies of social and economic development that take into account the potential impact of climate change.

Due to the over-exploitation of groundwater, and the of mixing the surface water with reclaimed wastewater, part of the fresh water has been changed into brackish.

At present there is a limited database on the sources of Greenhouse Gas (GHG) emissions in the Hashemite Kingdom of Jordan and the potential options to reduce or control emissions. The current greenhouse gas emissions are estimated to be equivalent to over 1 million ton of carbon dioxide per year, but no thorough study has been undertaken to estimate the emissions by source. Similarly, no inventory of the sinks has been prepared. In short, the country capacity to develop adequately and assess the data needs that is mandated by the Convention on Climate Change needs to be urgently built up.

UNDP/GEF-Funded Project: Vulnerability and Adaptation to Climate Change

The project describes potential implications of climate change on the water resources and related sectors. The aims are:

1. **define trends in the existing records of temperature, precipitation, evaporation and wind at a number of selected locations in Jordan;**
2. **investigate how an increase in temperature will change the existing above mentioned trends under alternative climate scenarios, e.g. an increase or a decrease in precipitation;**
3. **investigate under alternative climate change**

Objectives

The very nature of this topic calls first and foremost for more information and greater understanding of the threat being faced. This topic may be translated into the following broad objectives :

One. To understand and quantify the threat of the impact of climate change on freshwater resources.

Two. To facilitate the implementation of effective national measures, if and when the threatening impact is seen as sufficiently confirmed to justify such action;

Activities

1. **To study the potential impact of climate on areas prone to droughts and floods.**

2. **A new project will be undertaken on capacity building in the Hashemite Kingdom of Jordan to respond to the challenges and opportunities created by the national response to the Framework Convention on climate change. It will be funded under the Global Environment Facility.**

H. FRESH WATER SUPPLY

Basis of Action

Most of the fresh water supplies in Jordan are categorized as conventional groundwater resources. These sources are limited and in many cases over drafted. The developed groundwater quantities in 1995 were 445 MCM/ year from renewable aquifers and 62 MCM/ year from non-renewable basins. The safe yield from the renewable aquifers is estimated at 276 MCM/ year, which means that about 170 MCM/ year are being over-pumped. This over exploitation of fresh water resources imposes a major constraint on sustainable water development. Over 80% of the tapped water is fresh groundwater exploited with different quantities and qualities at varying depths ranging from few meters to more than 1000 meters.

Raise the efficiency of water supply networks to reach the standard of the developing countries (85%).

A number of constraints are recognized within this program area . This can help in defining the action plans for achieving the objectives. These constraints are described as follows:

One. Shortage of conventional surface and ground fresh water resources in the country.

Two. Growing demand for fresh water in all sectors (municipal users first, irrigation second and food industries third). This will widen the gap between demand and supply.

Three. Developing new fresh water resources is very expensive and cannot be afforded by certain sectors such as agriculture.

Institutional restructuring is an essential requirement for better water resources management

Four. Due to the over-exploitation of groundwater, and the of mixing the surface water with reclaimed wastewater, part of the fresh water has been changed into brackish.

Five. The most important conventional fresh water resources are shared with neighboring countries, including the Disi Aquifer in the south and Yarmouk River in the northern part of the country. No water agreements are available at present for these two sources.

Six. Fresh water losses and the unaccounted-for-water in the national distribution network amounted to 80% in one of the Governorates (Mafraq).

Seven. Using the fresh water resources for irrigation purposes with low efficiency and high losses, such as the irrigation in the highlands and at Disi-Mudawara areas.

Objectives

One. Define the balance of water demand and supply for the different sectors (Municipal, Irrigation, and Industrial).

Two. Define the gap of fresh water in Jordan vis-a-vis the different purposes for the short, medium and long term planning.

Three. Introduce the solutions, ways and means to bridge the gap.

Activities

In order to reach the sustainable development of the available fresh water, taking into consideration the previous constraints, the following activities were proposed :

1. Raising the efficiency of water supply networks to reach the standard of the developing countries (85%).

2. Setting a priority scale for different purposes. The first priority of using the fresh water is for the municipal sector, then the food processing industrial sector, followed by the irrigation sector and finally other industries.

3. Developing the available conventional water resources after conducting the required feasibility studies and securing the financing.

4. Activating and concluding water treaties with the neighboring countries to achieve our water rights for surface and ground water.

5. Developing a number of non-conventional resources, such as desalinating the brackish water in the areas close to the demand centers. Seawater desalination may rise in the future after becoming economically feasible.

6. Rationalizing fresh water usage by the domestic sector, to safeguard water quality.

I. INSTITUTIONAL AND FINANCIAL STRUCTURE

Basis for Action

Present institutional arrangements in the water sector are demonstrably inadequate to meet the challenges facing Jordan. Institutional restructuring is an essential requirement for better water resources management. Other requirements include: evaluation of the quantity and quality of renewable and non-renewable groundwater, completion of specific studies on brackish water and deep groundwater and modernization of the surface water and groundwater monitoring systems with respect to both quantity and quality.

Public and private sectors have to recognize that water is an economic commodity rather than a social entitlement and that charging a price reflecting the real cost for its use is the best incentive to all consumers to value it, protect it, and use it efficiently.

Cost recovery requires efficient and effective services that will recover the cost of water supply and deal with metering and billing, as well as the costs of wastewater collection, treatment and disposal, illegal connections and leakage. Although the costs of rehabilitation projects for the government are estimated at JD 201.5 million, financial and economic analyses are not yet available.

Objectives

It must be recognized that, in order to achieve or to implement a successful and sustainable water resources management, the institution serving as Authority must be strong, organized and empowered. The following broad objectives were identified :

One. A practical policy on tariffs, which includes the generation of revenues to cover operation and maintenance costs and debt servicing, and to provide an adequate contribution towards capital investment financing.

Encouragement of industries to implement modern recycling and wastewater reuse techniques, which minimize waste.

Two. Incentives for working in both the collection departments and operation divisions.

Three. Creation of a national committee empowered and well equipped to resolve water rights issues, determine priorities, establish rules and regulations for the protection of catchment areas, rivers and aquifers from pollution or excessive use, and to integrate land-use planning with infrastructure strategies.

Four. Legislation and enforcement preventing the discharge of untreated industrial wastes into watercourses.

Five. Encouragement of industries to implement modern recycling and wastewater reuse techniques, which minimize waste.

Six. Enforced metered connections by applying fines and penalties to illegal users.

Seven. Encouragement for industrial development which favors least polluting industries.

Tariffs and Cost Recovery

Water pricing is a sensitive political issue. At the same time, serious problems arise when water charges fail to cover the costs of providing, and maintaining the services. The Government needs to take appropriate action in this regard. Cost recovery requires expensive and effective services to cover the costs of metering, billing, illegal connections, and leakage. Pricing combined with properly enforced pollution penalties should be an important part of water conservation strategies.

Eight. A fee-system for industrial waste discharge based on both quality and quantity that would significantly encourage on-site pretreatment to control effluents according to standards, or to combine their discharges for treatment in a common facility. However a fee-system approach must go in parallel with efficient monitoring and enforcement. The fee-system would reduce water usage and waste disposal, especially after being coupled with the program to minimize industrial waste.

Activities

1. Institutional and legislative changes.

2. Creation of a national agency empowered and well equipped to resolve:

- **Water rights issues.**
- **Undertake water allocations.**
- **Protect catchment areas, rivers, and aquifers from pollution or excessive use.**
- **Integrate land-use planning with infrastructure strategies.**

3. Strengthen the role of the Ministry of Water and Irrigation (MWI):

Management Capacity

The Ministry of Water and Irrigation (MWI) has the responsibility of providing, operating and maintaining municipal, industrial, and irrigation water supplies, through WAJ and JVA. Yet they have limited autonomy or financial viability to undertake these tasks, without significant support from the Government. Their linkage to Government employment terms

and conditions, means that they cannot recruit or retain experienced professional staff, and skilled technicians and workers. The result is weak authorities without the guaranteed resources to operate effectively, with consumers unwilling to pay for the resulting inadequate and unreliable services.

1.2 LAND RESOURCES

A. INTRODUCTION

The severe limitation of agricultural land has been further aggravated by the loss of the best agricultural land to urbanization and industrial uses.

and economic activities are placing ever increasing pressure on land resources in Jordan.

Expanding human requirements and economic activities are placing ever increasing pressure on land resources in Jordan, creating competition and conflicts and resulting in non-optimal use of both land and land resources. These increasing pressures on land resources create environmental problems such as land degradation and contamination.

Land resources in Jordan are used for a variety of purposes, which interact and may compete with one another. It is desirable to plan and manage all uses in an integrated manner.

Integration should take place at two levels. At one level, all environmental, social and economic factors (including, for example, impacts in various economic and social sectors on the environment and natural resources) should be considered in an integrated fashion. At another level, all environmental and resource components should be considered jointly (air, water, biota, land, geological and natural resources).

B. PROGRAM AREAS

A. AGRICULTURAL LAND USE

Basis for Action

Jordan agricultural potential is limited. The rainfed agricultural sub-sector is limited by scarce and irregular rainfall and by the topography of the land in the higher rainfall zone: only 235,000 ha of Jordan area receive adequate rainfall for rainfed agriculture (greater than 350 mm), of which only about 155,000 ha have a slope below 25%. Jordan has a low potential for livestock production due to its meager rangeland resources and its inability to economically produce feed for fattening and milk production. Overgrazing, a succession of droughts and the appropriation of the better lands for rainfed crops have decreased considerably the fodder availability without decreasing the number of livestock.

Scarce surface and ground water resources constrict the expansion of Jordan irrigated agriculture. About 665,000ha in average are currently, totally or partially, irrigated. Potentially irrigable lands are largely confined to the Jordan Valley.

The agricultural land is further characterized by the preponderance of small size farming units, about 42% of land holdings have a size between 0-2 ha, and 69% are less than 5 ha.

The severe limitation of agricultural land has been further aggravated by the loss of the best agricultural land to urbanization and industrial uses. The fallow system, together with land speculation, further reduces

land available for agriculture. Most of the Badia have the traditional right of communally utilizing the land. Without settling the ownership and utilization rights of this Badia land, development programs, particularly by the private sector, could be greatly constrained.

Soils in Jordan are generally rich in clay content, which decreases towards the surface. The exceptions are soils derived from sandstone in southern parts of the country. In addition, most soils in Jordan are slightly alkaline with slightly decreased pH values in the Badia areas due to the presence of salt. Most of the soils are low in organic content, calcareous and weak in structure, saline and rich in silt content, especially in the eastern parts of the country.

Control transformation of cultivated lands into non-agricultural use with legislation appropriate to Jordanian conditions.

Overall, land use in Jordan is unbalanced and suffers from conflicts between the major land uses. Land use planning, supported by appropriate legislation, has become a necessity for achieving the balanced exploitation of natural resources.

Objectives

The following broad objectives were identified:

One. Identify, describe and geographically locate areas of arable land, and classify arable lands according to their suitability for different land utilization types.

Two. Obtain all information about land, necessary for agricultural and urban project planning, create and design database and use appropriate Geographical Information System to interpret data for different land uses and for future monitoring by setting up a national network for land use in Jordan.

Three. Review and develop policies and legislation for sustainable management and preservation of agricultural land, with participatory approaches.

Four. Improve planning, management and monitoring systems for agricultural land.

Activities

1. The Jordanian Government, with the support of local, regional and international organizations, should review and improve policies and policy instruments to support sustainable management of agricultural land.

1. **Review and develop regulatory framework, including laws, regulations and enforcement procedures to support sustainability and prevention of transfer of arable land for other uses. The policies should take into account the environmental, social and economic issues.**

2. **Initiate incentives and economic instruments and develop institutional mechanisms to assure sustainable management of agricultural land.**

3. **Establish databases of agricultural land capability to support sustainable development.**

4. **Strengthen management systems for arable land that include: crop rotation, integrated livestock, terraced agriculture, Hema reserve and pastorals.**

Develop indicators for measuring the sustainability of agricultural land use practices.

5. **Establish monitoring systems to continuously assess the environmental, economic and social impacts, risks and costs of agricultural activities, projects and practices.**

6. **Review soil classification for agricultural purposes and identify fragile soil for the best agricultural land use.**

7. **Initiate or improve systems for analysis and interpretation of data on agricultural land use.**

8. **Encourage land terracing, rehabilitation of rangeland and afforestation of steep sloppy areas.**

9. **Categorize cultivated land**

10. **Control transformation of cultivated lands into non-agricultural use with legislation appropriate to Jordanian conditions.**

11. **Build scientific understanding of agricultural land resources through supporting research activities that are directed towards the improvement of sustainable approaches to agricultural land use. Emphasis should be placed on the assessment of inherent soil properties and capabilities in the context of ecosystems, and pressures exerted on land resources by intensive agricultural and social practices.**

12. **Develop indicators for measuring the sustainability of agricultural land use practices.**

13. **Develop human resources by restructuring existing institutions, improving curricula and encouraging training at all levels - including schools, vocational centers and universities - to better meet the sustainable development needs. Improve extension services, with greater emphasis on the participation of all interested parties, including men and women farmers, and extension agents.**

14. **Strengthen institutions, with the support of regional and international organizations. Revise their mandates with respect to agricultural land resources to ensure the integration of environment, social and economic issues into agricultural land resource management. Also, ensure effective coordination and linkages between institutions working on agricultural land resource issues.**

15. **Launch awareness-raising campaigns to educate people on the importance of sustainable development of agricultural land resource. Campaigns should be joint endeavors of the government, private sector, interest groups and academic institutions with the collaboration of regional and international organizations.**

16. **Encourage public participation through certain procedures, programs and projects and services, especially those that are affected by the decision making and implementation process.**

B. RANGELAND RESOURCES MANAGEMENT

Basis for Action

Rangelands, defined as the areas receiving less than 200 mm of average annual precipitation, cover more than 90% of the total land area of Jordan. The present condition of rangelands in Jordan is generally poor to very poor. They urgently need demarcation, re-organization, management plans, strategies and action programs for their proper scientific management. Grazing is the optimal way of utilizing these areas, of converting native plants not usable by man to animal products suitable for human consumption. In most cases, present production does not exceed one-third to one-sixth of the potential productivity. The cause of this low productivity is overgrazing of the rangelands, resulting from a higher demand for animal products by a fast increasing population. Overgrazing inhibits several plant species from producing enough seeds to maintain suitable vegetation cover. Consequently, several important species have disappeared, and less palatable species have dominated and taken their place.

Overgrazing inhibits several plant species from producing enough seeds to maintain suitable vegetation cover.

Another factor that has led to the reduction of the rangeland productivity is the cultivation of cereals on marginally suitable areas with very doubtful economic return, leading to degradation of the land resulting from accelerated soil erosion.

Rangelands are generally state owned, but there are some private and/or communal grazing lands also. Usually, all rangelands are subject to traditional (tribal) grazing rights in specific areas. Being state property, these are treated as common wealth that can be used and over-used by anyone without restriction. Restriction in grazing rights means a reduction in family incomes, which could lead to socio-economic problems. Rangeland development programs, particularly by the private sector, are likely to be greatly constrained until ownership and utilization rights of the rangelands are clarified.

Uprooting of shrubs and other range plants for firewood deprives rangelands of their natural vegetation cover, and further intensifies wind and water erosion.

Objectives

One. Increasing the productivity and improving the management of rangelands on a sustainable basis, through management techniques, involving studies, installation of native shrubs and other fodder species, in association with water harvesting and other soil treatment techniques.

Two. Strengthening capacity building by: 1) Setting-up after appropriate training (a) a planning and management unit, (b) a research unit. 2) Improving - through training - the technical capabilities of the personnel who will staff the range unit.

Three. Ensuring a sustainable utilization of the forest and range resources by the design and implementation of rational management system, which will provide employment, help to enha
develop income generation activities for the rural communities.

Four. Defining land rights and using rights of the land by developing a model for that, so as to enhance friendship between land and man.

Activities

1. **Carry out a socio-economic survey and assessment of the pastoral resources, and identify**

Urban growth has extended over onto the traditional agricultural lands, exerting more pressure on the agricultural land, and consequently, enhancing the desertification processes.

the target areas and people for management activities.

2. Train pastoral communities and develop their skill needs for: 1) Better organization of the community; and 2) Active participation in the formulation, implementation and monitoring of the management program.

3. Select the candidates, design and deliver training courses.

4. Use different water harvesting techniques for feed grain/forage farming.

5. Develop new energy sources, including solar and wind energy and biogas, to meet the daily fuel needs of pastoral communities and alleviate destruction of natural vegetation.

6. Implement the principle of

to develop the science of range plant breeding.

7. Promote educational and vocational training for stakeholders.

8. Train the stakeholders in all aspects of range development, management and protection.

C. COMBATTING DESERTIFICATION

Basis for Action

Set up a long-term policy to combat desertification, and integrate this policy with the national policies for sustainable development

The total area of Jordan is about 89.3 thousand square kilometers. Rainfall distribution varies according to location and topography. Average annual rainfall ranges from a high of 600 mm in the northwest to less than 200 mm in the eastern and southern deserts, which form about 91% of the surface area.

Arid and semi-arid lands such as Jordan generally host sensitive, fragile ecosystems. Human interference can easily result in degradation if not carefully managed. Land degradation related to agricultural practices in irrigated areas is attributed to the salinization of the topsoil. In other areas, degradation processes include a) rangeland degradation, b) soil erosion, and c) urban encroachment.

Rangeland degradation is mainly due to overgrazing resulting from changes in livestock management practices. It also results from the conversion of rangeland resources to unsustainable forms of agriculture, such as cereals and vegetables, associated with the existence of ambiguous land tenure system.

Soil erosion and degradation in Jordan can be attributed to a combination of natural and land use management factors. The scarcity and degradation of the water resources ultimately affect the fertility of the land resources. Land loses its protective vegetative cover as it becomes less fertile, subjecting the soil to wind erosion. About one fourth of all rainfed land under cultivation in Jordan is used to produce cereals and vegetables in sloping areas subject to accelerated soil erosion.

In general, land use conflicts results in the damaging of cropping patterns. Increasing livestock grazing in the rangeland areas leads to over-consumption of the vegetation cover. Urban growth has extended over onto the traditional

agricultural lands, exerting more pressure on the agricultural land, and consequently, enhancing the desertification processes.

Objectives

One. Develop a methodology for assessing and mapping the dynamics of desertification, and the processes and hazards involved, in each ecological zone in Jordan.

Two. Set up criteria to determine priority areas to combat desertification.

Three. Diversi fy the income of people so as to mitigate poverty and reduce pressure on land resources.

Four. Adopt national sustainable land use plans and sustainable management of the water resources with help from Remote Sensing data and GIS systems.

Activities

1. **Collect all available literature and remote sensing data, and determine the scale of mapping of the various desertification hazards.**
2. **Survey and define criteria for desertification hazards; map areas accordingly.**
3. **Investigate the social, economic and policy factors connected with desertification.**
4. **Adopt national sustainable land use plans and sustainable management of soil and water resources, with support from Remote Sensing and GIS systems.**
5. **Carry out afforestation and soil conservation measures in areas prone to erosion.**
6. **Establish other alternative livelihood measures that could provide incomes in drought-prone areas.**
7. **Introduce alternative energy sources to reduce demand on wood for fuel.**
8. **Improve water use efficiency by adopting the most advanced technologies in irrigation systems, to minimize soil erosion, sedimentation and salinization.**
9. **Enhancing research for drought and saline tolerant crops, and seed production.**
10. **Set up a long-term policy to combat desertification, and integrate this policy with the national policies for sustainable development.**
11. **Establish a monitoring system.**

D. FOREST RESOURCES MANAGEMENT

Basis for Action

natural forest area is only 0.44% of the

40,594 hectares, constituting only 0.44% of the coun

These are fragmented, mostly undemarcated, unmapped, degraded forests of poor density, with practically no natural regeneration. Forest cover has been increased by 35,361 ha of man-made forests. Thus, the total forest area in the country became 75,955 ha, representing only 0.84% of the total area; while the rest of the declared forest of 150,862 ha is mostly hilly, steep, stony or rocky, with small patches of shallow soils and without any forest cover. Moreover, large areas of forests are still threatened by uncontrolled degradation, pests, misuse and pressures resulting from energy shortages in rural areas. To remove the deficit in forest cover and prevent further destruction of forests, joint efforts are needed to awaken public awareness and encourage public participation in the conservation activities.

Set up a national forest monitoring system.

Sustainable food production depends on a favorable environment. By protecting the soil from erosion and stabilizing hillsides, watersheds and other fragile areas in Jordan, we can help preserve the integrity of the agricultural land. They may also affect the climate and water regimes, both of which are crucial to agriculture in a dry country like Jordan. Forests are also valuable from the eco-tourism perspective. The shading and amenity of forest trees in Jordan are very important for tourism and recreational purposes. Therefore, it is not strange to see more than two millions of the residents visit the forests of Jordan several times annually for its shading and amenity.

Water harvesting is a primary activity to enhance afforestation.

The formation of a national forest monitoring plan is essential to forest management and sustainable forest

forest monitoring system needs improvement, despite some rudimentary achievements. There are many problems existing in the supervision and management of forest resources, such as grazing, illegal cutting, forest fires and interrelationship of forest ownership and user rights.

Objectives

One. Enlarge areas under forest vegetation and improve forest quality by plantations and extensive afforestation of bare or degraded lands best suited for forest crops.

Two. Organize, perpetuate and improve all forest stands so as to ensure maximum returns of forest

from them.

Three. Meet, as far as possible, the needs of the people for forest products, and to that extent, reduce dependence on imports.

Four. Protect and conserve existing forests, particularly in mountainous regions, where the forests help to regulate water regimes, such as perennial rivers, streams and springs, and to recharge underground water-bearing strata.

Five. Set up a national forest monitoring system, which includes local networks, a data monitoring system and geographical information system.

Pollution by plastic waste especially in the Jordan valley and irrigated lands is a major problem.

Activities

1. **Survey forest resources at different levels of details. Management of the survey data and forest registration data will be computerized through GIS, to facilitate information sharing within Jordan as well as with other experienced countries in the field of forestry.**

2. **Promote forest management activities to prevent forest destruction.**

3. **Enhance the forest management bodies at all levels, and endeavor to increase the public awareness of the significance of afforestation, encourage local community to use the forest in a sustainable manner.**

4. **Plant trees according to specific land conditions by adopting various afforestation methods.**

5. **Water harvesting as a primary activity to enhance the afforestation activities and increase the area covered by forest plantations.**

Use the Integrated Pest Management (IPM) approach to eliminate pollution by pesticides.

E. ALLEVIATION OF LAND DEGRADATION

E-1 SOIL EROSION

Conservation of soil cover

Basis for Action

Over half of the rainfed agricultural land in Jordan is located in terrain with gradients steeper than 9%, which are subject to soil erosion. In addition semi-arid rangeland have been converted to unsustainable forms of agriculture.

Objective

The following broad objective was identified: Conservation of soil cover.

Activities

1. **Establish a national soil conservation policy.**
2. **Adopt soil conservation measures.**
3. **Revise and enforce laws.**
4. **Make land tenure laws and regulations compatible.**

E-2 MINIMIZE SOIL POLLUTION

Basis for Action

The main causes for land/soil contamination in Jordan are:

- Pollution by plastic waste especially in the Jordan valley and irrigated lands.
- Negative impact of pesticides and chemical herbicides on the soil.
- Salinization of the soil caused by utilization of irrigation water with high salinity, over-cropping and overuse of land.
- Contamination by wastewater especially in the Zarqa River Basin.
- Treatment plants and waste disposal sites.

Objective

The following broad objective was identified : Eliminate soil pollution sources.

Activities

1. **Improve management of irrigation water.**
2. **Create incentives for recycling of plastic.**
3. **Strengthen agriculture extension.**
4. **Use the Integrated Pest Management (IPM) approach to eliminate pollution by pesticides.**

5. **Upgrade wastewater treatment plants.**
6. **Revise and enforce laws.**
7. **Ensure continuous monitoring.**
8. **Develop and implement programs for the rehabilitation of degraded lands by polluted water and salinity.**

Set up a national land use planning system

E-3 MINING SPOILS

Basis for Action

Exploitation of minerals may lead to the loss of agricultural land and may be a major source of dust and air pollution. In Jordan, most of the production of phosphate and potash takes place in remote areas, where the effects are limited, however cement and other quarrying activities do take place near the populated centers.

Objectives

The following broad objectives were identified :

One. Protect agricultural land.

Two. Eliminate or minimize air pollution.

Activities

1. **Enforce the Mine Closure Act.**
2. **Rehabilitate mines.**
3. **Conduct Environmental Impact Assessment studies for all mine development activities.**

F. URBAN PLANNING ISSUES

Basis for Action

Urban environmental problems tend to be increasing in Jordan and may become a predominant obstacle to environmental sustainability. Unacceptable interaction between major industries and urban areas has occurred because of the lack of proper urban planning. Industries are concentrated in and around urban areas especially in Amman, Zarqa and Aqaba. The absence of mass transit system leads to degradation of air quality due to vehicular emissions, especially in Downtown Amman.

Objective

Set up a national land use planning system.

Activities

1. **Link the policy for establishing industrial zones with land uses policy.**
2. **Promote use of unleaded fuel.**
3. **Develop public transportation.**

G. LEGISLATIVE AND INSTITUTIONAL ISSUES

Basis for Action

The existing planning laws, building regulations and permits rules are too rigid and require major revisions.

Multiplicity and overlapping responsibilities of institutions related to land resource management lead to conflicts in policy.

Multiplicity and overlapping responsibilities of institutions related to land resource management lead to conflicts in policy.

The absence of a comprehensive land use law leads to land degradation, loss of many native species of plants and animals, and loss of agricultural lands by uncontrolled urban expansion.

Lack of specialists trained in the wide range of urban environmental issues.

Objectives

One. To enhance, improve and strengthen planning, management and evaluation systems for land use and land resources.

Two. To review and develop policies to support the optimal use and the sustainable management of land.

Three. To strengthen institutions related to land use and management and improve coordination among them.

Four. To maintain and generate a database and information system aimed at facilitating integrated land use planning and management.

Activities

1. Develop policies that encourage sustainable land use.
2. Review the regulatory framework including laws, regulations and enforcement procedures.
3. Adopt improved systems for the interpretation and integrated analysis of data on land use and land resources.
4. Adopt the principle of optimal land use and physical planning.

1.3 AGRICULTURAL RESOURCES

A . IMPROVING AGRICULTURAL PRODUCTIVITY

Basis for Action

The population of Jordan is increasing rapidly due to the high growth rate and forced migration. Sufficient amounts of agricultural products have to be made available to meet the population demands. Thus, the agricultural inputs have to be intensified in order to overcome the limited arable land and to avoid the expansion onto the fragile marginal lands. Intensifying inputs could create environmental risks and market fluctuation. Misuse of fertilizers, pesticides, and plastics leads to soil deterioration and affects as well the quality of agricultural products. There is an urgent need to maximize the yield and simultaneously minimize the environmental and economic risks. Where quantity of inputs is limited, other agricultural activities have to be encouraged.

The production of crops out of their seasons guarantees higher revenues.

Objectives

One. To improve the productivity of farms in a sustainable manner, increase diversification, efficiency and food security and improve rural incomes.

Two. To enhance the capacity of farmers through technology transfer and by improving and developing rural infrastructure.

Three. To develop and adopt an integrated natural resource management system in order to save resources and protect the environment.

Four. To create employment opportunities particularly among poor families and those living in marginal areas.

Activities

The government of Jordan at the proper level, with the support of the regional and international organizations, must pay attention to the following:

1st. Productivity (Plants)

The productivity of both the irrigated and rainfed areas, for the different crops, is still below their capacities. This is particularly marked in the rainfed lands. The production systems in many cases contribute to soil degradation and result in

environmental hazards. It is necessary to improve productivity and produce sufficient food, while es in a sustainable manner and promoting and enhancing integrated farm management technology. This can be achieved by the following:

1. **Crop rotation: Crops vary widely in their needs for nutrients, quantitatively and qualitatively. Therefore, in order to maintain the soil fertility and the soil moisture and to protect the crops from infection by diseases, the lands have to be planted with different crops in rotation. In the rainfed areas, cereals, legumes and summer crops must be included in these rotations.**

2. **Enhancement of biological nitrogen fixation: It is well known that leguminous crops are able to fix atmospheric nitrogen in the soil. This permits reduced application of nitrogen fertilizers and consequently the pollution associated with these fertilisers. The contribution of legumes to soil fertility depends on varieties and harvesting systems.**

Encourage use of organic wastes as nutrient sources.

3. **Encouraging use of organic wastes as nutrient sources: Different organic wastes derived from agricultural or industrial activities are sinks for nutrients and sources of pollution. Therefore, re-use of these wastes reduces pollution and decreases the need for chemical fertilizers.**

4. **Enhancing efficient utilization of inputs: The use of fertilizers to improve the quality and to increase the production has to be evaluated to avoid excessive costs to be incurred as a result of pollution. In the same manner, the use of pesticides and plastic should be controlled.**

5. **Improving production technology by using soil-less agriculture, agricultural plastic, and fertigation: Using volcanic ash (as an alternative for soil) and introducing fertilizers together with irrigation water (fertigation) and controlling the temperature by using the plastic houses. Such technologies can help cope with scarcities of agricultural land and of water, in addition to reducing the use of fertilizers and establishing proper conditions for the production of crops beyond their seasons,**

6. **Crop pattern: It is important to control quantities of crops produced to avoid marketing problems and surpluses and maintain returns to the farmers.**

7. **High price value agricultural products: The production of crops out of their seasons guarantees higher revenues. Similarly, the production of special quality products for export purposes. For example, seedless grapes produced in the Jordan valley can be exported to Europe.**

8. **Incentives: These can be either in the form of service extension and/or provision of research and development (R&D). Such incentives can encourage farmers to produce crops of good quality using new technologies**

2nd. Pollution Reduction

Polluting the environment by application of agricultural inputs is beginning to require serious attention in Jordan. Different measures have to be taken to limit such adverse effects on the public health, and to facilitate marketing the products at proper prices. To achieve that, the following activities must be considered:

1. **Integrated Pest Management (IPM): One of the factors limiting the export of agricultural products is high residual pesticide levels in these products. Instead of using pesticides, it is highly recommended to use biocides in addition to using resistant varieties. Research in this regard has to be intensified and funded.**

2. **Establishing pest forecasting system: It is essential to plan cropping schedules in light of insect population cycles, timing of disease infection, and so on, in order to increase the efficiency of pesticides application.**

Promote regional collaborative mechanisms to increase the efficiency and cost-effectiveness of sustainable management of shared resources.

3. **Research has to be focused on types, rate and proper application methods of fertilizers and pesticides in order to minimize these sources of pollution. In addition, research has to focus on solarization as a mean of sterilization. Attention has to be given to fertigation, drought and salt resistant crops to reduce the use of agricultural inputs and related sources of pollution.**

4. **Establishing training programs in different areas to create knowledgeable trainees in using fertilizers, pesticides and the impact of plastic residual materials on agricultural lands.**

One of the factors limiting the export of agricultural products is

5. **Monitoring system: Well equipped laboratories have to be established and well trained researchers created to monitor the residual levels of fertilizers and pesticides in the products and in the irrigation water.**

6. **Certification program: An independent governmental or non-governmental agency has to be responsible for providing certificates for the quality of crops. This will facilitate the export and marketing of agricultural products and minimize health hazards.**

7. **Promote and improve local investment.**

8. **Initiate and maintain farm surveys to ensure the application of appropriate technologies and the participation of the farming communities in identifying their constraints and options, in order to reach the best solutions.**

9. **Investigate the possibility of integrating different agricultural sectors.**

B. MANAGEMENT OF IRRIGATION WATER

Basis for action

In addition to limited agricultural lands, Jordan is suffering from a scarcity of water resources. The issue will be aggravated in the coming years, since the water demand of different sectors, domestic, industrial and agricultural is increasing, and the development of other water resources is limited. The current amount of available water in the irrigation sector is

about 700 MCM. By the year 2010, the water demand for agriculture is expected to be 1088 MCM . Therefore, an additional 388 MCM of water will be needed to satisfy the agricultural demand. Water demands of other sectors will increase too. The available aquifers are shared with neighboring countries and so far, no common agreement on their use and protection has been reached. Hence, the alleviation of the problem is an urgent necessity. This could be achieved through water harvesting such as constructing dams and reservoirs, re-using treated wastewater, changing crop patterns, introducing drought resistant crops, improving irrigation systems to increase irrigation efficiency as well as desalinating sea water.

Improve water use efficiency

The protection of available water resources from contamination by fertilizers, pesticides and industrial products, with the help of a monitoring system and public awareness programs, would serve to enhance the efficiency of water use and promote conservation and to alleviate the pressures on water resources.

Encourage investment in water-saving technologies

Objectives

One. Protect the quality and utility of available water by reducing and treating wastes to prevent contamination and degradation of surface and ground water bodies.
Two. Management of water scarcity, to insure that the overall integrated patterns of water supply are sustainable, and to reduce potential conflicts and economic costs of adjustment that may be required of different sectors and water users.
Three. Encourage investment in water-saving technologies, and strengthen capacities needed to change water use behavior patterns.
Four. Promote regional collaborative mechanisms to increase the efficiency and cost-effectiveness of sustainable management of shared resources.

Activities

The activities needed to achieve the objectives of this program will concentrate on supply, demand and policy adjustments:

1. Monitoring the quality of water resources by:

One. Designing proper land-fills and incineration plants to get rid of wastes that could contaminate surface and ground water.
Two. Strengthening the systems for monitoring irrigation water quality. Physical, chemical and biological water quality standards should be set up and applied.
Three. Introducing and implementing pollution charges, which have a great potential for pollution prevention, provided there are adequate enforcement mechanisms.

2. Improving water use efficiency by:

One. Adopting the most advanced technologies in irrigation water systems.
Two. Using drought tolerant crops.
Three. Selecting suitable cropping patterns to preserve soil

fertility and avoid marketing problems and losses.
Four. Minimizing soil erosion and sedimentation by implementing a soil conservation program.
Five. Minimizing adverse effects from agricultural chemicals by applying IPM programs.

3. Using non-conventional water resources such as:

One. Reuse of treated wastewater provided it complies with agricultural regulation standards.
Two. Water harvesting.
Three. Use of brackish water for irrigation of salt tolerant crops.
Four. Desalination of sea water when economically feasible.

Re-allocating water used for irrigation should be investigated to overcome problems of scarcity and poor water quality.

4. Regional cooperation with regards to shared aquifers.
5. Developing environmentally sound aquaculture technologies that are compatible with local, regional and international water resources management plans
6. Evaluating economic feasibility and assessing environmental impacts of aquaculture
7. Options for re-allocating water used for irrigation should be investigated to overcome problems of scarcity and poor water quality. Treated wastewater could be used for irrigation in the northern part of the Jordan Valley where it could be mixed at appropriate ratios with the high-quality water from the Yarmouk River and where also high precipitation could alleviate poor quality of treated wastewater.
8. Using efficient conveying methods by farmers to conserve water.
9. Introducing artificial drainage in irrigated areas to maintain the water table at appropriate depths and to retard the movement of salts.
10. Equity changes in water prices and charges. These policies should be complemented with programs to encourage the adoption of water saving technologies. Farmers should be motivated to conserve water since conservation is associated with savings in water costs and increased income through increased productivity that may be realized through better water control and adoption of new high-return cropping patterns.
11. Strengthening the existing legal framework to insure that environmental requirements are enforced and complied with.
12. Reforming institutional roles and relationships, and building technical capacities to carry out integrated water management.
13. Increasing the role of non-governmental organization (NGOs) in establishing regulatory and economic instruments.
14. Educating communities about the pollution-related impacts of the use of fertilizers and chemicals on water quality.

C. SCIENCE AND TECHNOLOGY FOR SUSTAINABLE AGRICULTURE

Basis for Action

Agricultural research in Jordan is mainly hampered by insufficient

Initiate technologies with the ultimate goal of optimizing production under sustainable use of resources

numbers of researchers and lack of a strategy that is capable of organizing coherent activities directed to solving problems hindering the achievement of sustainable development. The current structure and strategy of the National Center for Agricultural Research and Technology Transfer (NCARTT) look ambitious. They spread resources thin, addressing isolated problems within production systems. The problem is aggravated by the lack of sufficient facilities.

Basic and applied agricultural research is carried out within university systems. The most needed steps to make agricultural research more relevant to sustainable development include: 1. Restructuring agricultural research centers to consolidate and concentrate on specific problems within technology units rather than within

The agricultural sector in Jordan faces many difficulties including resource inadequacy and insufficient applied research related to current production and management practices. Sustainable agricultural science and technology aims to combine high productivity with high quality, while making optimum and efficient use of resources.

Objectives

One. Develop and/or transfer agricultural technologies

Two. Direct research potential and capabilities within a strategy that emphasizes integrated approaches and aims at specific goals.

Three. Establish links among institutions and ministries concerned with agricultural research and technology transfer.

Four. Improve the socio-economic situation of researchers and scientists working in this field.

Five. Restructure research centers and faculties of agriculture to improve performance and links with agricultural production.

Activities

1. Assess current agricultural inputs and technologies for suitability in sustainable agriculture, including resource utilization rates, quantity and quality of agricultural produce and impact of cultural practices on the environment.

2. Initiate technologies with the ultimate goal of optimizing production under sustainable use of resources and inputs including water, fertilizers, pesticides, plant species or cultivars, taking into consideration their interaction with soil and microclimatic parameters. Research should be directed towards finding alternative resources and/or devising methodologies to utilize resources that otherwise would not be used due to technical limitations.

3. Channel innovative biotechnological research and technology in areas such as: tissue culture, cross protection, plant transformation for disease resistance, fermentation, drought, cold or heat stresses, high productivity and good quality, biological and / or fermentation treatment of agricultural debris to convert them into feed or base for other industries.

4. Conduct research on developing environmentally safe methodology in pest control that will stress integrated pest management, pest forecasting and warning systems and the use of biological pesticides.

5. Establish links between R&D institutions interested in agricultural research and the NCARTT, in order to synchronize efforts towards well defined research goals.

6. Establish financial capabilities to fund agricultural research using means such as establishing boards for the crops. As boards secure money from farmers with charges on sales of their crops, they can then support contracted research that will benefit the farmers.

7. Consider restructuring NCARTT and faculties of agriculture in such a way to concentrate research efforts towards well-defined objectives, and to increase interaction among research programmes and units, other ministries, R&D institutions and private industry.

8. Support and finance graduate programs in the faculties of agriculture at the Universities and evaluate the capacity of the curricula to meet the objectives of sustainable development.

9. Improve the working atmosphere, the salary structure, provident funds and retirement plans for researchers and scientists in this field.

Establish effective information and technology transfer systems.

D. RURAL DEVELOPMENT AND AGRICULTURAL LABOR FORCE

Basis for Action

About 50% of agricultural laborers are unskilled non-Jordanians.

Agriculture in Jordan depends heavily on unskilled non-Jordanian laborers. About 50% of agricultural laborers are non-Jordanians. Thus a portion of the value added in agriculture is remitted abroad. There is a need to involve Jordanians more in this sector. Agricultural laborers are not covered by the Labor Law, and hence, they are deprived from social security benefits. A socio-economic and educational program should be considered to cover the agricultural laborers.

On the other hand, rural population suffers from continuous drain by immigration to urban areas. Natural resources, including land and water, are being used in a non-sustainable manner.

From this standpoint, there is a need to increase food production in rural areas. Using the agricultural resources in a sustainable approach requires appropriate action for the protection of agricultural resources. Cottage food industries and other off-farm income generating activities are important to increase Jordanian contribution to the agricultural labor force and alleviate immigration to urban areas.

Objectives

One. Enhance the participation of Jordanians in the agricultural labor force.

Two. Develop rural infrastructure such as soil and water conservation, terracing and range management.

Three. Enhance off-farm income opportunities and enterprises.

Activities

1. **Laws and regulations should be changed to ensure sustainable use of agricultural resources. In addition, the Labor Law and regulations should be extended to include agricultural laborers or specific regulations pertinent to agricultural workers should be issued .**

2. **Initiate and encourage diversified energy programs that are environmentally sound, favoring sustainable development of renewable energy sources and improve energy efficiency.**

3. **Provide mechanisms to preserve threatened areas that could protect wildlife and conserve biological diversity.**

4. **Establish rural infrastructures to conserve soil, water, range forests and develop watershed areas to prevent further ecological imbalance.**

5. **Adopt policies that would provide incentives to farmers to undertake conservation measures regarding resources.**

6. **Initiate and encourage integrated farming systems that would stress food security and diversify income sources in rural areas.**

7. **Undertake off-farm income-generating projects that will emphasize cottage agro-processing industries including medicinal and aromatic packaging workshops, improved local food industries (such as pickles, radishes, jams, dried vegetables and fruits, labneh**

8. **Encourage the participation of rural population with special**

other public institutions in all facets of sustainable development through workshops, training, extension and awareness campaigns.

9. **Establish effective information and technology transfer systems. This should be coupled with strong extension services to reduce food loss due to spoilage or pests and that would enhance the conservation of soil and water resources.**

10. **Provide a mechanism for financing new innovative technology that would improve the quality of locally produced traditional food or other activities that would tap the resources in a sustainable approach.**

1.4 ENERGY RESOURCES

I. INTRODUCTION

Jordan imports most of its energy needs

Jordan imports most of its energy needs. The energy issue has posed a difficult challenge for Jordan. Its lack of conventional commercial energy resources places a burden on the national economy. The relatively high cost of imported oil and the high investment capital needed for energy projects pose a challenge for economic and social development. Socio-economic development needs large amounts of energy.

For the period 1975-1983, the growth of Gross Domestic Product (GDP) in Jordan reached its highest level, of 11% annually, while the average growth rate of energy consumption was about 15% annually. During 1983 -1989 both GDP and energy consumption growth rates declined to about 3.5% annually. Since 1996, the economy has experienced a low growth rate, estimated at 1 % annually, as a result of the faltering peace process.

Jordan is blessed with high potentials for solar and wind energy as well as the availability of huge oil shale reserves. Moreover, Jordan has pursued a program for promoting new and renewable energy through assessment of technological developments combined with the implementation of appropriate technologies, demonstrations and pilot projects. Jordan should be in a position to switch to new, highly efficient and environmentally superior energy resources as they become economically viable. Additionally, the social values of these resources have to be considered so that the merits, other than fuel savings, could be included in the economic evaluation of these resources.

The national goal in the energy sector is to provide adequate energy for intensive development, at the least possible cost. Major components of the Jordanian

The overall objective is to achieve sustainable development in the energy sector and to meet the needs of socio-economic development. This can be achieved in the following ways:

1. Setting a long-term strategy, strengthening energy planning and management and integrating them with the relevant economic and development policies,

2. Energy planning for alternatives as well as conservation methods for the existing sources,

3. Formulating and selecting energy problems, defining goals and finding alternative solutions,

4. Performing a national energy assessment,

5. Examining alternative forms of electricity generation as well as conservation alternatives and audits, defining the issues associated with oil shale utilization and renewable energy, including the use of municipal wastes as an alternative feedstock for electric generation,

6. Promoting utilities regulatory policy act and considering appropriate avoided costs when dealing with new and renewable facilities; addressing rural energy development and setting up policy solutions to rural energy problems,

7. Discussing energy sector policy and techniques and launching initiatives for management, pricing policy and electricity system expansion planning through Independent Power Production (IPP), pollution assessment and control through the implementation of Environmental Impact Assessment (EIA),

8. Achieving an adequate level of security in energy supply and diversifying supply sources through exploring and developing conventional energy resources such as oil and gas.

II. PROGRAM AREAS

A. FORMULATION OF A COHERENT SERIES OF POLICIES

Basis for Action

There is a strong relationship between the national economy and the energy sector, which is considered as the basic prerequisite for development and growth. Moreover, the needs of economic development and environmental protection require comprehensive and integrated energy, environmental and economic planning, in order to assess management polices for energy supply and demand and to assess the effects of environmental

protection measures with view to coordinating the energy, environmental and economic sectors and thereby harmonizing activities.

Jordan's new economic plans are based on achieving more economic liberalization and integration into the world economy and private sector participation in Jordan. A new partnership agreement with the European Union will contribute to the existing sustainable development process. The Energy Charter Treaty with Europe will help Jordan to successfully coordinate energy issues.

The inefficient use of any form of energy is an indirect tax on the economy.

Jordan has recently formulated a growth-oriented economic adjustment strategy integrating environmental concerns. The strategy focuses on achieving real progress in industrial and agricultural development through the optimal utilization of scarce resources. It sets out the Government's expectations and targets for the energy sector along with other sectors of the economy. The strategy calls for strengthening energy sector institutions in planning, management and technical areas.

Economic development and environmental protection require comprehensive and integrated energy, environmental and economic planning

A long-term investment plan for the energy sector has both the objectives and content of a medium-term sectoral or macroeconomic plan. A long-term plan aims at helping policy-makers and planners to understand the consequences of the long term policy and investment decisions taken today and to anticipate long term requirements. It is a strategic document reflecting policy objectives. Jordan's energy planners must keep up with the trends in world oil price forecasts, especially since the economy of Jordan is highly sensitive to any changes in the world of oil prices. This is due to the heavy dependency

economy. Large investment decisions may be influenced by expectations of future oil prices, (e.g. decisions on renewable energy use and on the eventual timing of oil shale use as indicated in the relative project proposal in Chapter Three).

The inefficient use of any form of energy is an indirect tax on the economy. A comprehensive national program of energy efficiency and energy conservation is now seen as an indispensable element of energy policy, a very important component of such a policy is correct energy pricing.

Features inherent to Jordan's energy system have determined the important requirements for comprehensive energy planning, these features include:

One) Jordan has limited energy resources such as oil shale deposits, tar sands, a small hydropower potential, a few low-temperature geothermal sources and bio-gas. With the exception of natural gas, solar and wind energy, Jordan's endowment of energy is modest.

Two) The energy bill constitutes about 7.2% of the GDP and is growing at about 5.2% per annum.

Three) Most of Jordan's known energy reserves, such as oil shale, heavy oil, tar sands, are not of high quality. In addition, their exploration, development and utilization is rather difficult and

currently not economically feasible.

Develop renewable energy resources

Four) The per-capita energy consumption is around one-ton-oil-equivalent per annum which is fairly low. This per-capita consumption is expected to grow as the promise of better economic growth becomes a reality

Five) The share of renewable energy in the total primary energy consumption is around 2%. The strategy calls for increasing the utilization of renewable energy as it is environmentally beneficial.

Six) Natural gas is being used for power generation, contributing up to about 17% of total electricity generation and 4% of the total energy consumption.

Seven) Jordan is still concentrating its efforts to explore all possible indigenous resources to cover the increasing demand for energy and reduce the burden being imposed on costly energy imports. Unless a commercial discovery of oil or gas is made, the prospects of domestic energy resources making a significant contribution to meeting the country's commercial needs appear bleak in the foreseeable future. However, the participation of the international oil companies in petroleum exploration, as envisaged under the Government's recent program, would greatly improve the probability of commercial discovery of oil and gas. Several exploration concession agreements have been signed to achieve this goal.

Support the research, development, transfer and utilization of various environmentally friendly energy systems

Eight) The transportation sector consumes the largest portion of the total consumption of primary energy, 41%, followed by the industrial sector at 21% and household at 20%.

Nine) Total electricity consumption was 5122 GW in 1996 with industrial consumption ranking first 35%, followed by the residential sector 30%, pumping water 18.2% and commercial sector 11%.

Objectives

Jordan is currently, and will remain for the foreseeable future a net importer of energy. The government's energy policy will be focused on:

One. Introduce ways and means to conserve energy uses.

Two. Increase the proportion of clean energy and accelerate new and renewable energy utilization.

Three. Expand electrification in the rural areas.

Activities

These activities should be carried out by different government agencies and socio-economic groups to promote the improved use of energy resources in support of sustainable development in Jordan:

1. **Strengthen the institutional framework and continue implementing sector reforms.**

2. **Promoting oil and gas exploration activities by private and bilateral oil companies.**

3. **Develop renewable energy resources.**

4. **Promoting demand management and energy conservation measures to encourage efficiency in energy use.**

5. **Privatization of the government owned utilities.**

6. **Implementation of a regulatory regime that provides transparent, stable and objective ground rules governing energy production, consumption and the environment.**

7. **Initiation of steps to create a regional power, oil and gas interconnection network.**

8. **Establish an energy vision that extends beyond the short-term. This vision should address both the delivery of energy supplies to Jordan and the potential to re-export energy into the region.**

9. **Support the research, development, transfer and utilization of various environmentally friendly energy systems; follow a new energy path that uses new technologies and approaches and train personnel in the energy sector on different technologies associated with energy utilization; build capacities at the institutional, managerial and technical levels.**

10. **Expand the construction of power network.**

11. **Develop oil shale power generation facilities to alleviate the pressures for imported heavy fuel oil once this becomes economically and environmentally feasible.**

12. **Popularize co-generation of heat and power and central heat supply and the utilization of waste heat.**

13. **Develop pump storage facility as the best means of peak electrical demand management.**

14. **Make great efforts to expand rural electrification by integrating renewable energy application as part of this program.**

15. **Collect, develop, update and extrapolate energy, environment and economic data needed to identify optimum approaches and strategies.**

16. **Establish energy, environment and economic data centers at both national and international levels.**

17. **Develop relations between governmental authorities, grass root and non governmental organizations to assist in this process.**

18. **Implement and enforce Environmental Impact Assessment strategies for industrial and economic development.**

Adopt realistic pricing of energy products to reflect their real cost of production

B. ENHANCEMENET OF ENERGY CONSERVATION AND ENERGY MANAGEMENT

Basis for action

Energy conservation and optimization are important and basic elements in the energy policy of

Jordan and considered to be critical

import bill. The need for improving energy conservation and optimization of energy use stems from the fact that most economic growth in Jordan so far has been energy intensive.

Ministry of Energy and Mineral Resources (MEMR) has been entrusted with the task of conserving energy in a systematic manner and optimizing its use in order to:

One) Reduce the economic burden of the imported energy

Two) Alleviate the environmental impacts accompanied with the production and consumption of energy

Three) Reduce the need for new investments.

Reward customers who adopt energy-efficient technologies

Energy conservation is an organized effort towards reducing energy consumption without reducing the standard of living. It is a way to make the energy system function more economically without heavily investing in technical equipment.

Per capita primary energy consumption in Jordan is about 1033 kg.o.e./ year and the per capita of electrical consumption is about 1152 kwh/year. The energy intensity has been improving because of the numerous energy conservation measures taken by MEMR. It dropped from 1015 kg.o.e. for 1000 JD in 1994 to 892 kg.o.e. in 1996.

Objectives

The following broad objectives were identified by participants of the agenda 21 process as the objectives of Jordanian society as a whole with respect to energy conservation and management:

One. To reduce energy consumption and investment costs in the energy sector. It is anticipated that direct savings in energy will be about 80000 k.o.e. per year (2% of total primary energy consumption) in addition to savings in investments, which are estimated at twice the value of fuel saved (based on crude oil prices of 1997).

Two. To improve the energy efficiency per unit output throughout all stages of energy production, transport, processing and utilization.

Activities

These activities should be carried out by different government agencies and socio-economic groups to contribute to sustainable energy management:

1. **Adopt realistic pricing of energy products to reflect their real cost of production. This is important and can be an extremely effective instrument in promoting energy efficiency and overall conservation.**

2. **Enhance tax programs rewarding customers who adopt energy-efficient technologies or undertake efforts to reduce the pollution resulting from their energy production process.**

3. **Stipulate direct government regulations, particularly in transport and industrial sectors. These regulations should cover a broad range of energy-related activities and equipment such as**

Encourage foreign companies to invest in oil shale projects through

and Transfer -

schemes.

Jordan has very large oil shale reserves of more than 40 billion tons

lighting, insulation and space heating.

4. **Undertake comprehensive energy audits of key industries, commercial and transport institutions.**

5. **Improve operation and management conditions in various institutions working in the energy field and improve their control methods.**

6. **Provide national institutions with clear mandates to provide energy consulting services to individuals, companies and institutions.**

7. **Enhance and support efforts of energy and electricity advisory centers to incorporate energy conservation into national economic and social development programs. The use of mass media,**

awareness education materials at the primary and secondary school levels would positively improve education about energy conservation and increase public awareness of energy conservation.

8. **Strengthen international collaboration in the field of energy conservation.**

9. **Expand scientific research and exchanges in the study of energy conservation.**

10. **Utilize pumped storage technology to reduce peak demand overloads.**

C. CONTINUE ASSESSING WAYS AND MEANS FOR OIL SHALE UTILIZATION

Basis for action

Jordan has very large oil shale reserves of more than 40 billion tons. The average oil content is about 10% by weight. Jordan has investigated technologies related to oil shale utilization either by direct burning to generate electricity or by resorting to extract oil products. These investigations have concluded that the exploration of oil shale by both methods is technically viable. However, the economic feasibility of the oil shale utilization will await further price increase of crude oil.

The 40 billion tons of oil shale would contain about 4 billion tons of crude oil. Once utilized, oil shale in Jordan could meet all energy requirements for Jordan for more than ten decades. The key to successfully exploiting the oil shale is the use of appropriate technology that meets technical, economic, environmental and institutional requirements.

Objectives

An oil shale development program would be adopted with an objective to select the path that would minimize the financial risk and that would be implemented through formulating programs that would determine the feasibility of utilizing the oil shale as an energy source. Thus, the objectives of this program area are:

One. To achieve a greater degree of energy self- sufficiency and greater degree of diversification.

Two. Create a significant number of job opportunities in Jordan.

Three. Reduce foreign exchange payments for expanding alternative fuel imports.
Four. Develop a new and large industrial activity for the Jordanian economy.

Activities

1. **The government of Jordan will support the Energy Research Center to conduct R&D as a first step towards developing this energy resource to a commercial level which could represent an excellent opportunity for Jordan.**

2. **Demonstration plants are recommended to be established to investigate using this viable alternative source of energy for**

needs.

3. **Encouraging foreign companies to invest in oil shale projects including financial and specialized technical aid so that Jordan contributes only in the local costs within a well defined agreement and seeking the interest of foreign**

and Transfer -

4. **Conducting a total comprehensive scientific evaluation of the national capabilities in this field, and the efforts made by cooperating foreign institutions concerning resources and ways of utilization.**

5. **Following-up on studies in technology development with training of local technicians and the preparation of the national human resources so that they are ready to benefit from related projects in the future.**

6. **Continuing with the R & D and exploration operations as well as detailed studies of the size of reserves.**

7. **Pinpointing the scientific, technological and economic barriers to utilizing these resources.**

8. **Working on serious programs to solve scientific and technical problems through collaboration with appropriate international and national experts.**

9. **Giving special attention to the provision of the appropriate water resources necessary for the utilization of oil shale.**

10. **Giving due-attention to the environmental issues resulting from the utilization of oil shale in collaboration with the institutions entrusted with the legislations concerning this issue.**

D. DEVELOPMENT & EXPLORATION OF CONVENTIONAL OIL AND GAS RESOURCES

Basis for action

Jordan depends almost totally on imports of oil to meet its energy needs. Oil and gas have been discovered in very modest quantities, representing about 4% and 1% of the imported quantities of gas and crude oil respectively.

Gas reserves are not yet defined and can be considered as fairly limited. Natural gas has been used for power production since 1989, which contributes to about 15% of total electricity generation in the country.

Adopt commercial standards and specifications for the exploration and production of the natural resources

Objective

Development of national/local conventional sources of energy through oil and gas exploration in order to decrease reliance on the imported oil and reduce burden being imposed on the Jordanian economy due to the high energy bill.

Activities

1. **Adopt an open-door policy to negotiate joint-ventures with international oil and gas companies to develop and generate investment needed for exploration activities.**

2. **Build national capacities in the fields of prospecting, exploration, drilling, production and processing.**

3. **Develop a reliable databank.**

4. **Market potential areas and those not covered by cooperation treaties.**

5. **Increase the scientific and practical training programs at all levels.**

6. **Increase the productivity and capacity of the local laboratories supporting the national efforts in the fields of R & D, exploration and prospecting and supplement them with scientific expertise within detailed programs for oil and gas industry services.**

7. **Encourag R&D in the field of oil, gas, and other supporting sciences in the universities and non-governmental research institutions.**
8. **Strengthen cooperation with other Arab countries in the fields of prospecting, exploration and field operations.**

9. **Keep up-to-date with the new scientific and technological developments and learn from the international experiences of other companies, especially those working in Jordan.**

10. **Develop oil and gas fields and the evaluation of the reserves availability of these resources.**

11. **Adopt commercial standards and specifications for the exploration and production of the natural resources.**

12. **Set up necessary procedures to price oil products, and suggesting suitable legislation to control the taxation and pricing mechanisms.**

13. **Establish an energy structure that is friendly to the environment and increase the production of clean energy, thus making the energy system functioning more economically.**

E. PROMOTING AND EXAMINING THE PREFERENTIAL USE OF NEW AND RENEWABLE ENERGY RESOURCES

Basis for action

Jordan is blessed with the abundance of renewable energy resources such as solar and wind, in addition to small hydro, biogas, geothermal. The current share of renewable energy in the total energy mix is about 2%, among which 1.8% is due to the utilization of solar water heaters. Other applications of renewable energy are: solar pond, two wind farms for power

generation, water pumping by windmill, and Photovoltaic (P.V) cells for electrification.

The UNDP/GEF Wind and Solar Energy Project aims at promoting the use of renewable resources in the rural areas that are not technically and economically suitable for electrification by the national grid system in order to improve the environmental well-being of the rural areas communities. The project also aims at removing the legislative, technical, financial and economic barriers towards a cost-effective use of renewable energy resources thus reducing the dependency on conventional sources which will lead to the reduction if GHG

Objective

Promoting and examining the preferential use of new and renewable energy resources

Activities

1. **Increasing the scientific and technological capacities so that wind and solar energy can provide for an increasing percentage of the energy, aiming at 10% contribution in the year 2010 and 15% in the year 2020. This requires the consolidation of efforts related to solar and wind energy into one center for R & D with different experts, researchers and technicians working to on specific development projects that cover all possible activities (heating, electricity generation, industrial and agricultural applications, material tests, etc...). The center should also support and coordinate different and complementary studies and research. This requires surveys and field work to determine the magnitude of the different types of renewable energy and their potential.**

2. **Building a national database related to renewable energy and making it accessible to Jordanian industry and other related institutions.**

3. **Developing the training capacities in Jordan in order to train technicians, managers and decision-makers in the renewable energy field, as well as in establishing and evaluating renewable energy systems.**

F. PROMOTING THE USE OF OTHER RESOURCES

Other resources in Jordan include the reserves of tar sand near the Dead Sea and some possibility of hydro energy in dams, geothermal energy, and bio-mass. The following is a summary of the suggested strategies for those energy resources:

a) Tar Sand

Tar Sand is an extreme case of heavy oil. Sand or sand stone is impregnated with heavy viscous asphalt oil and are usually exposed at only a thin over burden. Tar Sand is known to exist in Jordan in Wadi Isal on the eastern side of the Dead Sea. The deposits were encountered in depths up to 600 meters. The estimated reserves of Tar Sand are about 40 million tons containing about 4 million tons of crude oil. It would be beneficial to gain from the experience of other countries with large reserves of this resource. However, taking into account the high cost of its utilization, the safe and sound strategy is to conduct studies on an R&D level only.

Universities and scientific centers can assist in conducting such studies.

b) Uranium

The Ministry of Energy and Mineral Resources (MEMR), with the cooperation of the International Nuclear Agency has conducted 16 projects to employ nuclear energy for the development of peaceful projects such as; power generation, agriculture and industry, medicine, exploration of minerals, water, and others. MEMR has adopted a long term planning policy for the 21st century aiming at utilizing nuclear energy for peaceful applications.

c) Biogas

Biogas has already been studied extensively in Jordan and should be commercialized in the very near future. The main objectives of such plants are:

Transfer this technology to remote areas to provide them with an independent energy source.

Improve the quality of life to the villagers by converting wastes into useful power and energy.

Convert waste products into useful fertilizers.

Avoid diseases and bad odor resulting from animal waste disposed of and exposed to the open air.

Geothermal energy may be developed in various agricultural and commercial applications

Reduction of Methane Project

The goal of the UNDP/GEF funded project is to reduce emissions of greenhouse gases in Jordan by substituting fossil fuels with bioenergy (methane gas and electricity), produced from anaerobic digestion of industrial and municipal waste in Amman. Additional greenhouse gas reduction will be achieved by reducing the uncontrolled release of methane from improperly disposed organic waste in a large landfill. The project's main activities include a combination of a landfill operation and a biogas plant. The required institutional, management, and social structures to sustain the project will be developed through technological exchanges and training programs. A prime activity of the upgraded institutions will be the capability to generate replicable projects in

d) Geothermal

Jordan has limited geothermal resources in the form of hot springs. These hot water springs may not be suitable for use in power production due to their low thermal gradients. Some further investigations are still necessary before a decision of utilization can be taken.

Generally, the most important geothermal deposits are found at the intersection of two or three trends where locally small extensional zones enable the surface waters to be heated through deep circulation. The deep heating system is essentially vertical along faults or fractures. On their return to the surface, the hot fluids pass across several aquifers in sedimentary beds.

Jordan thus possesses geothermal systems at two levels:

1. Medium energy (110-140 degree centigrade) resulting from the vertical tectonics.
2. Low energy (30-65 degree centigrade) resulting from the aquifers heated by the deep fluid circulation.

Geothermal energy may be developed in various agricultural and commercial applications such as

heating greenhouses and fish farming.

e) Hydro power

Hydropower potential is very limited

The lack of water resources in Jordan and the scarcity of rivers or waterfalls make the hydropower potential very limited. However, there are some locations where hydropower is being utilized in a small level, these resources are located at:

King Talal Dam
Wadi Arab Dam
Aqaba thermal power station.

1.5 MINERAL RESOURCES

I. INTRODUCTION

Ancient mining activities took place in Jordan, especially during the Bronze Age between CA 3500 to 1500 BC. Wadi Araba represents a unique place to observe the technology of ancient copper mining and smelting through a period of about 800 years. Iron ore was mined and smelted to produce Iron during the Ayyubid-Mumlukes times from 1250 to 1517 Ad.

Copper and gold are metallic minerals of possible economic importance in Jordan

In 1965 the Jordanian government established the Natural Resources Authority (NRA), as a government organization in accordance with law No-12 for the year 1968. The (NRA) is entrusted with the responsibility of drawing policies, planning and execution of exploration programs for developing and exploiting mineral resources and industrial rocks in Jordan in cooperation with other concerned authorities.

Enhance private and public sector cooperation in all stages of research, design, development

Since that time significant achievements were made as a result of systematic geological, geochemical, geophysical surveys and detailed studies, which led to the evaluation of numerous mineral commodities, especially industrial rocks. Feasibility studies were also carried out in order to utilize viable commodities. Based on the results obtained, many industrial rocks are mined and produced nowadays to meet the local market demands, and for export purpose. In addition a number of other industries have developed using mainly locally available raw materials including: Ceramics, cement, potash, fertilizers, glass, calcium, carbonate, rock wool, and brick making,.

The NRA, through its exploration programs, studied thoroughly numerous metallic and non-metallic raw materials in addition to energy resources. It suggested to the government to establish a mining company to carry out the above mentioned studies in order to utilize the aforesaid raw materials for different industrial uses based on the results of the studies. The main task of establishing such a mining company is to increase the production of presently mined raw materials and to create mining industries in Jordan depending on available natural resources.

The reasons behind the slow development of

1. The government does not allocate enough funds to cover required studies for mining projects (processing, concentration, pilot studies and economic feasibility studies).
2. Pilot plants and research and benefaction centers for processing and concentration of ores are non existent.

II. PROGRAM AREAS

1st. EVALUATION OF GEOLOGICAL CHANCES FOR DEVELOPMENT OF UN-EXPLOITED METALIC RESOURCES

Basis for Action

Metallic minerals of possible economic importance in Jordan are: copper and gold in wadi Araba, and warda iron ore in Ajlun

early ancestors who mined and exploited a large amount of copper and iron at different intervals throughout the history of the country.

A previous gold mining project was carried out in 1991. Recent geochemical prospecting in Jordan by the geochemistry division in NRA detected anomalous gold values in the northern part Jordan. The bast anomaly, sighted over felsic volcanic rocks, retains gold values of up to

40g/t in heavy mineral concentrates collected from Wadi beds.

Objectives

The main objectives of this program area are:

One. Exploration and exploitation of metallic minerals of possible economic importance in Jordan including copper, manganese and gold in Wadi Araba area.
Two. Setting up programs for comprehensive survey, exploration and evaluation of various other metallic mineral resources.

Activities

1. Continue with the geological and exploratory studies especially in open-cast mines.

2. Update the economic feasibility study to construct a small plant for copper mining (3500 tons annually) taking into consideration world market prices and utilizing state-of-the-art technologies.

3. Conduct experimental studies on manganese ore aiming at producing non-metallurgical manganese.

4. Improve mining laws and regulations to encourage investment in mineral resources.

5. Conducting EIA studies prior to any mining activity to insure sustainable development.

6. Establish a system for continuous monitoring of natural resources by governmental and non-governmental sectors to insure sustainable development.

7. To enhance private and public sector cooperation in all stages of research, design, development and mining.

8. Promote and market the local mineral resources worldwide.

B. EVALUATION OF GEOLOGICAL CHANCES FOR DEVELOPMENT OF EXPLOITED NON-METALLIC RESOURCES

Mineral resources are divided into metallic and non-metallic. A metal bearing strata refers to mineral deposits from which metal or metals can be extracted by mining and using mechanical or chemical processes to separate them. Non-metal strata are naturally occurring substances which do not have metallic properties such as high luster, conductivity, opaqueness, or ductility values. They include materials such as stones, sulfur, or salts as well as those present as aqueous solutions or brines.

Basis for Action

on non-metallic minerals. The Jordanian industry has developed various productive activities, which are classified into 14 sectors. These sectors include several traditional ones, such as the mining of natural resources (potash and phosphate) and a number of new ones, such as the variety of food processing, engineering and manufacturing industries that provide products for local and export demand. The total of national industrial exports reached JD716 million (US$1026.4 million) in 1994 of which US$403 million were in potash, phosphate and fertilizers.

Jordan has exploitable reserves of industrial rocks and minerals including granite, feldspar, silica sand, gypsum,

The government is currently considering several private sector proposals for commercial extraction of oil shale as an industrial fuel substitute. Jordan also has exploitable reserves of industrial rocks and minerals including granite, feldspar, silica sand, gypsum, bentonite, limestone, tripoli, zeolite, and volcanic tuff.

Objectives

The main objective of this program area is to improve the mineral resources management system. The specific objectives are:

One. Reinforcing geological exploration to provide necessary proven reserves and geological information on major minerals in compliance with the needs of economic construction and geological capability.

Two. Reviewing existing laws and regulations that deal with exploration of mineral resources and conservation of geological environment.

Activities

Activities for processing and concentration of non-metallic resources will include:

1. **Update, modernize and develop ore processing laboratories in Jordan in addition to training of the qualified staff.**

2. **Benefit from the pilot plant available in the research center of the Phosphate Company and other laboratories in universities and research institutes.**

3. **Establish research and development centers for investigation of new usage and better utilization of existing minerals.**

4. **Optimization of state-of-the-art technologies for mineral exploration.**

5. **Establish more mining activities that are environmentally safe by conducting comprehensive EIA studies and risk assessment evaluation.**

6. **Define and improve the role of planning at the national and regional levels for the efficient utilization and protection of resources geared to meet the objectives of sustainable economic development and current measures of economic reform.**

7. **Protection and efficient utilization of water resources.**

8. **Enforcing and updating land reclamation during and after mining operations.**

C. EVALUATION OF GEOLOGICAL CHANCES FOR DEVELOPMENT OF UNEXPLOITED NON-METALLIC RESOURCES

The non-metallic resources and industrial rocks that are not currently exploited in Jordan include: diatomite, sulfur, barite, zeolite and semi precious stone.

Basis for Action

Non-metallic minerals, which are of possible economic importance in Jordan, include Bentonite and Diatomite in the Azraq Basin. The geological chances for further prospecting and exploration activities are promising in the large areas covered by lacustrine sediments in the northern Wadi Sirhan area, and in particular, in the Azraq Basin.

Objectives

The main objectives of this program area are:

One. Exploration and exploitation of metallic minerals of possible economic importance in Jordan like: Bentonite and Diatomite.

Two. Setting up programs for comprehensive survey exploration and evaluation of other non-metallic mineral resources.

Activities

1. **Adopt strategies with short and long-term programs.**

2. **Implement prospecting and mining programs with the objective of industrial uses for any mineral ore.**

3. **Conduct extensive feasibility studies in conjunction with pilot plants.**

Chapter Two

Integrated Management for Environmental Protection

2.1 WATER QUALITIY

A. INTRODUCTION

Only 156 liters per capita per day is all that can the country afford to allocate municipal water to its citizens at the present time

Water is a scarce commodity in Jordan. The per capita share of indigenous renewable freshwater resources has been estimated at 175 m^3 in 1996. A mere 156 liters per capita per day is all that can the country afford to allocate municipal water to its citizens at the present time. These figures are amongst the lowest in the world and even in the Middle Eastern region. The country is heading towards reaching the unsafe edges of water affordability and accessibility. Demand will outstrip the total exploitable resources by the year 2000; 1095 and 869 million cubic meters per year respectively. Water scarcity is not only associated with the quantity available but also with the quality which should meet specified standards in order to be useful.

The water scarcity problem is further

growth rate estimated at 3.5% (a combined natural increase plus immigration). Although it is expected to decrease to 3.3% by 2005, it remains amongst the highest rates in the world. With increasing populations, Jordan will be faced with the dual dilemma of increasing demands, on the already limited freshwater resources, and more wastes generated. Thus, freshwater extraction will be on the increase, as will threats to the quality of these water resources. Hence, the protection and management of freshwater resources must focus on protecting and managing both their quantity and their quality.

Wastewater Treatment plants' efficiency continuous to be

Transboundary issues are becoming important. High proportions of the water resources currently available to Jordan are resources shared with neighboring countries. The quality of such resources can be highly dependent on the behavior of these riparian partners. Jordan should ensure that the quality of such resources is protected through the implementation of water quality monitoring programs.

The following Program Areas are proposed in order to protect the quality of Jordan water resources.

B. PROGRAM AREAS

A. INSTITUTIONAL SET UP, REGULATORY AND STANDARDS ISSUES

Basis for Action

regulatory standards are based on guidelines issued by the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO) and other international standards including those enacted in Europe and the United States. This approach to national standards was perhaps inevitable in the short-term, but it is widely recognized to be inappropriate for the longer-term. For the longer-term Jordan needs to promulgate national standards adapted to meet local conditions

Only six of the 16 wastewater treatment plants in Jordan were reported in 1996 to have met their design performance expectations. These six were also the only ones producing effluents conforming to the requirements of the Jordanian Regulatory Standard JS: 893/1995 for discharge to wadis. Upgrading the effluent of the other 10 WWTP is

necessary to protect both surface and groundwater resources.

Objectives

Water quality monitoring is performed by several institutions with little or no co-ordination

One. Establish and strengthen technical and institutional capacities to identify and protect potential resources.

Two. Devise and promulgate locally-tailored water quality standards and guidelines to suite the local environment and socio-economic conditions.

Three. Develop human resources as the key to capacity building and a pre- requisite for implementing water quality management.

Four. Regulate and implement

Activities

Improve data collection and dissemination of information related to water quality

Enforce regulations and local standards related to water quality

1. Establish locally-tailored effluent regulatory discharge standards and ensure compliance with these standards.

2. Strengthen the administrative and legislative measures required to protect the quality of water resources.

3. Enforce regulations and local standards related to water quality.

4. Maintain and upgrade water quality laboratories to fully test for all quality parameters described in local standards for all water and wastewater uses.

B. MONITORING PROGRAMS AND DATA MANAGEMENT

Basis for Action

Several governmental and quasi-governmental departments with little or no co-ordination among them perform water quality monitoring in Jordan. Monitoring programs are primarily carried out at the laboratories of the Ministry of Water and Irrigation, Ministry of Health and the Royal Scientific Society (RSS). The latter has been subcontracted by the General Corporation for Environmental Protection (GCEP). However, lack of co-ordination among these departments has led to inefficient utilization of the national testing capabilities; duplication of efforts among these agencies and dilution of responsibility.

Objectives

The following objectives were identified:

1. Enhance monitoring of domestic and industrial treatment plant effluents and irrigation return flows.

2. Collect and manage information on the quality of water for surface water, groundwater and wastewater at the national level.

3. Make monitoring and assessment information accessible to decision-makers in the various sectors, as well as to researchers, and the public at large.

Activities

1. **Define water quality status and trends.**

2. **Ensure co-ordination between national water quality monitoring laboratories and**

optimize the utilization of available national analytical potentials.

3. **Strengthen the monitoring of drinking water quality.**

4. **Enhance networks for the monitoring and continuous surveillance of water receiving wastes and diffuse sources of pollution.**

5. **Improve data collection, storage, updating, modeling and dissemination of information related to water quality.**

6. **Strengthen and improve planning - especially assessment of the impacts of different types of projects - on water resources, demand and supply, quality and reuse.**

C. INNOVATIVE TECHNOLOGY AND RESEARCH

Basis for Action

Little, if any, applied original research in the water quality field, has been carried out to deal with water issues specific to Jordan. There are several potential areas of water quality research that can be only properly achieved through national initiatives and efforts. Jordan should strengthen and encourage local water quality research. Research on water salinity, production of locally tailored water quality standards for various uses, and conducting epidemiological studies are particularly needed.

Raise awareness on water issues such as quality concern, conservation and protection practices

Objectives

One. To encourage indigenous original research in the water quality field in such a way that local specific issue are duly addressed and tackled by national capabilities while drawing on international experience.

Two. To encourage low cost innovative technologies in the field of water and wastewater treatment and reuse.

Activities

1. **Perform research and development activities in support of water and wastewater treatment technologies, and wastewater reuse. Integrate findings into new designs.**

2. **Promote development of low-cost services that can be sustained at the small community level.**

3. **Develop local water-saving technology and recycling systems.**

4. **Promote co-operation with international institutions to keep updated with modern technological advances and to facilitate technology transfer and adoption.**

D. PUBLIC AWARENESS AND WATER QUALITY EDUCATION

Basis for Action

Public awareness of the extent and severity of the water scarcity problem Jordan is facing has been modest, and so have been the attitudes in dealing with it. Public knowledge of water issues, whether related to water utilization or water

protection is insufficient in light of the seriousness of national water issues. This can be attributed to complacency on the public side and to a lack of communication between planners and users. It is only in the last few years that water conservation awareness campaigns have been launched in the media. Most of these awareness programs concentrate on the urgency of using less water by the general public.

High population growth rate has lead to uncontrolled disposal of wastewater

However, governmental institutions, administrators, private sector business and industrial people, academics, religious groups and the mass media at large ought to be targeted as well. Such campaigns should also reflect the integrated nature of water plans. Issues that should be particularly targeted in these campaigns include: the consequences of water quality deterioration, the need to protect scarce freshwater resources from pollution and the need to refrain from using high quality water for purposes that can be satisfied with lower quality water.

Objectives

One. To enhance public involvement and educate the public about water quality issues, including the condition of their drinking, agricultural and recreational waters.

Two. To raise awareness on water issues such as quality concern, conservation and protection practices.

Activities

1. **Conduct public awareness campaigns aiming at water quality awareness issues.**

2. **Improve hygiene education to reduce diseases associated with water and wastewater.**

2.2 WASTEWATER MANAGEMENT

2.2.1 MUNICIPAL WASTEWATER

I. INTRODUCTION

The environmental and health problems associated with human liquid wastes have changed over the years. The cities, towns, and villages of Jordan spilled out uncontrollably into the surrounding agricultural land under the pressures of population movements, which have been precipitated by the political and military events since 1948, as well as a high rate of natural growth. Traditional methods of individual on-site excreta disposal were no longer suitable for congested population centers, in part due to their impact on local ground water aquifers.

In 1968, the Ein Ghazal Activated Sludge(AS) plant was commissioned for Amman. The plant was designed to handle a hydraulic load of 260,000 m3/day and an organic load of 18 tons/day BOD5, based on a design population of 300,000 and water use of 200 l/c/d and wastewater strength of 300 mg/l. A cholera epidemic in 1980 paved the road for abandoning the Ein Ghazal plant and construction of the Khirbet Al-Samra Stabilization ponds. The epidemic highlighted, at once, the threats inherent in uncontrolled re-use of properly treated wastewater for irrigation under adequate environmental health safeguards, and the problem of septage.

Extend the sewerage system coverage to all major towns, by the year 2010

The 1980s witnessed the introduction of modern sewerage systems into the main cities of Jordan, with treatment plants replacing the traditional individual cesspits then in common use. By 1997, there were about 16 municipal Wastewater Treatment Plants (WWT) serving about 2.4 million people (57% of the total), 16 smaller plants for institutions (hospitals, etc.) and 3 for industrial locations.

II. PROGRAM AREAS

A. EXTENDING SEWERAGE SERVICE COVERAGE

Public sewer networks reach about 80% of households in Greater Amman, but only 4.5% in other urban areas

Basis for Action

During the last two decades, considerable progress has been achieved in the wastewater sector.

-1990, contributed to this. This progress was also a result of intensive programs constructing sewerage collection and treatment plants. By 1997, about 16 municipal treatment plants were in operation, including the Samra stabilization ponds, receiving about 70% of total wastewater treated.

However, despite these achievements, there are a number of issues that remain to be tackled, including the following:

1. Public sewer networks reach about 80% of households in Greater Amman, but only 4.5% in other urban areas, making a countrywide average of 25% households (about 50% of the population).

2. There is still room for expansion of the Greater Amman system and others and need for establishment of new systems for the many un-sewered urban centers, urban fringes and slum impoverished settlements.

3. Around 12% of households nationwide, mostly in rural areas are

Moreover, there is a need to improve the design, construction and maintenance of the individual on-site disposal systems; septage removal and disposal is also another issue in the sector.

4. Many cases of pollution of water and food occur annually, many of these are caused by intrusion of sewage into water systems, through weak joints or broken sewers, blockages and overflows, seepage from cesspits or septic tanks, and disposal of effluents into seils (wadis).

5. Strength of raw influent entering treatment plants is in the range of 500-1600 BOD5 mg/l. This imposes several operational problems; even with high removal efficiency, the effluent BOD5 will still have a BOD5 high enough to cause re-use and disposal problems.

Objectives

One. Increase coverage by sewerage systems in urban centers and urban fringes.

Two. Upgrade efficiency of the existing public wastewater systems.

Three. Strengthen the information system of the wastewater sector.

Four. Upgrade the existing wastewater treatment system.

Activities

1. **Extend the sewerage system coverage to all major towns, by the year 2010.**

2. **Provide and construct sewerage systems as part of an infrastructure package for slum areas, and foci of poor settlements.**

3. **Establish more wastewater treatment facilities.**

4. **Upgrade the operational and handling capacities of the existing wastewater treatment units.**

5. **Retrain existing maintenance crews on preventive maintenance operations.**

6. **Rehabilitate and maintain public wastewater systems systematically.**

7. **Evaluate technically the performance of the wastewater treatment plants.**

8. **Systematically monitor the influent and effluent quality and the operational stream in the plant, with appropriate records.**

There is no national wastewater strategy with comprehensive goals and policies

B. PROMOTING INTEGRATED WASTEWATER MANAGEMENT

Collaborate with regional and international programs on the integrated development of rural areas.

Basis for Action

The wastewater sector has received due attention and support since the early eighties. Since then, the government has achieved a high level of wastewater collection, treatment and re-use. However, there has been a lag in management aspects of this sector, which has been overshadowed all the time by the water supply sector.

Despite the achievements of the Ministry of Water and Irrigation in the construction of sewerage collection and treatment systems, some crucial issues remain to be resolved, including:

There is no national wastewater strategy with comprehensive goals and policies.

The institutional structure suffers from the lack of clear lines of authority and responsibilities, and from weak coordination and integration; all these factors can weaken the delivery of services.

There is no clear and precise definition and description of the duties and tasks of different administrative units.

Management of personnel suffers from deficiencies including vague or non-existent job descriptions, lack of incentives and motivation, lack of systematic training activities for developing and enhancing the performance and output of staff.

There are deficiencies in the operation and maintenance of the wastewater collection system (house connections, sewers, appurtenances, etc.) and the treatment plants (structures, equipment, treatment operations, records, etc.).

Breakdowns in the sewerage system and the treatment plants occur occasionally; failure to respond to these breakdowns

adequately and promptly create hazardous situations and precipitates public health risks.

Objectives

One. Ensure that all Jordanians will have access to proper sanitation services, integrated with other infrastructure services.

Two. Promote sound management of the wastewater sector.

Three. Strengthen the wastewater information system.

Activities

1. **Establish effective co-ordination among institutions and agencies carrying out activities in the wastewater sector; e.g., Housing, UNRWA, etc.**

2. **Collaborate with regional and international programs on the integrated development of rural areas.**

3. **Develop (a) practical guide(s) for the control and operation of wastewater systems.**

4. **Institute systematic and accurate recording and reporting practices.**

5. **Develop job descriptions, conduct training activities and on-the-job training for all employees in this sector.**

6. **Strengthen computer facilities and develop a comprehensive wastewater information system.**

7. **Improve existing reporting system to include environmentally related diseases.**

8. **Develop proper legislation to ensure the operation of the reporting system, information release and data accessibility.**

9. **Develop a general strategy compatible with any existing (or proposed) strategy in the sector.**

10. **Define and build the links needed to ensure information and to meet the needs of wastewater management professionals and others, using the various systems available for generating, collecting, processing, storing and disseminating information.**

11. **Establish improved methods for generating and processing of data on operational and technical systems.**

12. **Review and update design criteria and operational procedures in the treatment plants.**

C. MAXIMIZING ENVIRONMENTALLY SOUND REUSE AND RECYCLING

Basis for Action

Reuse of wastewater is a necessity

Water demand in Jordan cannot be met by the available supply capacity. In the semi-arid conditions of Jordan, reuse of wastewater is a necessity. It is estimated that in 1997 about 73.5 MCM of wastewater were received in the 16 municipal treatment plants, of which about 61.7 MCM (83 %) were used directly or indirectly for irrigation. This represents about 10% of total water

available for irrigation**.** (The irrigated area in Jordan is estimated at: 14,000 dunums for controlled irrigation and 81,000 dunums for unrestricted irrigation). A number of issues that have to be considered:

More than 70% of all wastewater is treated in one facility, the Khirbet Al Samra waste stabilization ponds (WSP).

Increase coordination with NGOs, local authorities, and media on re-use and re-cycling issues

Several treatment plants are overloaded, most notably the Khirbet Al Samra where loading of the ponds reaches about twice the designed capacity.

Most re-use is indirect; effluent is discharged to a natural wadi (seil) and withdrawn some distance downstream along the wadi The Al Samra facility discharges its effluent into the Zarqa river and ultimately into the King Talal Dam.

Objectives

One. Ensure safe reuse of treated sewage for agricultural purposes.

Two. Strengthen the control programs for monitoring and assessment.

Three. Promote awareness and coordination in the sector.

Activities

1. Ensure the implementation of established criteria for the use of treated wastewater, in cooperation with other concerned agencies.

2. Conduct monitoring on the quality of treated wastewater and the corresponding quality of irrigated crops.

Introduce biological toxicity tests into the national standards

3. Introduce biological toxicity tests into the national standards for identifying industrial wastewater to be discharged into public sewers.

4. Develop monitoring programs for microbiological and chemical contamination in crops under irrigation by treated wastewater.

5. Co-operate with concerned authorities in surveillance of sewage-related diseases.

6. Co-ordinate with the health authorities in monitoring the health conditions of the operators of sewage treatment plants

7. Develop protective measures through legislation and other means, in cooperation with other relevant sectors, to reduce pollution in the catchment areas of aquifers and of impounding reservoirs.

8. Assist in and promote the development and implementation of land use planning.

9. Stipulate environmental impact assessment for all water/wastewater projects.

10. Enhance public awareness through educational and promotional activities .

11. Conduct educational activities targeting the farming communities involved in the reuse of wastewater in irrigation.

12. Conduct educational programmes to minimize generation of wastes at source, and

on the health concerns associated with re-using wastewater.

13. Encourage cooperation with industries on minimization of wastewater and adoption of recycling practices.

14. Increase coordination with NGOs, local authorities, and media on re-use and re-cycling issues.

15. Collaborate with regional and international programs for information exchange and knowledge transfer.

Industry is becoming increasingly important in social and economic development

Waste minimization is a basic tool in advancing sustainability

D. PROMOTING ENVIRONMENTALLY SOUND WASTEWATER DISPOSAL AND TREATMENT

Basis for Action

Waste minimization is a basic tool in advancing sustainability because it helps reduce the amounts of all types of wastes released into the environment. However, the released wastes still need to be treated and disposed of by safe, environmentally sound systems. Jordan has achieved a high level of sewerage treatment. In 1997, municipal systems treated about 73.5 MCM of wastewater in 16 treatment plants, serving about 2.4 million population.

However, there are issues that require attention and consideration:

Encourage development of environmentally sound waste disposal units for rural areas

Many communities still depend on cesspools for sewage disposal, but such systems have become inadequate due to the increase in population, limited lots of land and unsuitable geological/topographical conditions.

In rural areas, where individual systems exist, about 3% of population lack proper access to appropriate sanitation services.

Practices in unplanned land use have encroached on fertile lands, scattering the housing schemes, industrial estates and other developmental projects causing problems of provision of adequate services and control of health hazards and sanitary impacts.

Effluents from WWT plants are discharged into the nearest seil (wadi) which is usually dry for most of the year. Some effluent seeps into the groundwater and a considerable portion of it is used for irrigation, though the quality of the treated effluent is not acceptable for unrestricted irrigation.

Due to unforeseen pressures, such as population movements and financial constraints, the pace of providing sewerage systems has slowed down; treatment plants are overloaded.

Objectives

One. Ensure that urban liquid wastes are collected and disposed of through hygienic and environmentally sound processes.

Two. Ensure that all Jordanians will have access to proper sanitation services (integrated with other infrastructure services).

Activities

1. **Provide sewerage systems with treatment facilities to the unsewered areas.**

2. **Improve the wastewater treatment plant serving Baqa` basin.**

3. **Enlarge and expand the treatment plants at the following locations; Karak Madaba, Ramtha, Mafraq, Karak, Tafileh.**

4. **Construct new treatment plants for Greater Irbed Area.**

5. **Provide treatment plants for under privileged areas; slums, refugees camps.**

6. **Provide treatment plants for development projects at tourists sites; (Petra, Dead Sea).**

7. **Improve design and construction of individual on-site excreta disposal systems for rural areas.**

8. **Encourage development of environmentally sound waste disposal units for rural areas.**

9. **Develop a national system for sludge collection and disposal for septic tank/cesspit systems.**

10. **Participate and promote upgrading of existing dump sites for `septage` disposal.**

2.2.2 INDUSTRIAL WASTEWATER

1. INTRODUCTION

Industrialization involves major activities promoted by the Government of Jordan in its development policies and strategies. Industry is becoming increasingly important in social and economic development and a major contributor to the Gross Domestic Product. In addition, industry is providing employment and livelihood opportunities and contributing to the enhancement of human welfare in Jordan. Industry plays a key role in helping to achieve sustainable development through more efficient production processes, preventive strategies and cleaner production technologies and procedures throughout the life cycle of the product, hence minimizing or avoiding wastes.

Industries should be full participants in the implementation of activities related to Agenda 21. Environmental management should be among the highest priorities and a key element to sustainable development. This can be achieved by taking into consideration environmental criteria for the siting of industries and adopting guidelines for assessing environmental impacts of new industries, carrying out audits and assessments of compliance and openness with the public.

The improvement of production systems through technologies and processes that utilize resources more efficiently and at the same time produce less wastes - achieving more with less - is another important pathway towards sustainability for industry.

II. PROGRAM AREAS

A. POLLUTION PREVENTION AND CONTROL

Basis for Action

Control is often expensive and requires complex regulatory efforts. By reducing pollutants before they enter the environment, the risk to

human health and the environment is decreased, and the cost of regulating and cleaning up pollutants is less. This implies moving towards pollution prevention and cleaner production, optimizing efficiencies at each stage of production. Cleaner production can improve the overall competitiveness of an enterprise, improving its efficiency of resource use, minimizing waste and protecting human health and environmental quality.

The traditional approach in Jordan has always been to control regulated pollutants as they are released to the environment. In a country like Jordan, this kind of control is not often very efficient. This is mainly due to inadequate legislation, in addition to gaps in available

Objectives

One. Increase the efficiency of resource utilization and reduce the quantity of waste discharged per unit of economic output. Pollution should be prevented or reduced at source whenever feasible.

Two. Industrial wastewater should be treated in an environmentally sound manner adopting pollution prevention and recycling techniques.

Three. Disposal or other release into the environment should be employed as a last resort and should be conducted in an environmentally safe manner.

Activities

1. Promote and strengthen institutional capacities, including guidance and advice to industries.

2. Strengthen the partnership between government and industry for implementing the principles and criteria of sustainable development. Closer co-operation on environmental issues related to industrial firms is needed between public, government and private institutions, particularly the Amman Chamber of Industry,.

3. Cleaner production policies should be incorporated into investment.

4. Industries should have a strong policy commitment to pollution prevention and control.

5. Introduce a mix of economic instruments such as funding assistance (i.e. grants, incentives, tax breaks, subsidies) and normative measures such as laws, legislation and standards, in consultation with industry.

6. Promote the use of cleaner production, with special consideration for small and medium size enterprises, through technical and financial support.

7. Review regulations to determine their impacts on reducing resource use and encouraging voluntary private initiatives.

8. Provide public treatment systems, especially, for the small and medium industries, to address the problems of solid waste and wastewater.

Promote the use of cleaner production, with special consideration for small and

9. Support and coordinate development and implementation of concepts and methodologies for internalizing environmental costs into accounting and pricing mechanisms.

10. Implement a comprehensive monitoring program.

11. Delineate responsibilities and duties and encourage complementation.

12. Encourage systematic data and information exchange, such as annual reporting on environmental records of industry.

13. Promote technological and know-how cooperation between enterprises, encompassing identification, assessment, research and development, management, marketing and application of cleaner technology.

14. Encourage and conduct research to promote and support innovative technological solutions to environmental problems.

15. Strengthen cleaner production information dissemination.

16. Expand existing databases / establish new databases to increase information available on waste generation and technical abilities.

17. Initiate, support and encourage participation and involvement of industry and increasing awareness, education and training related to sustainable development, such as cleaner production.

EIA is a technique that can be used to integrate environmental considerations into industrial projects

B. ENVIRONMENTAL MANAGEMENT

Basis for Action

There are two main features of Environmental Management that industries should adopt: Environmental Impact Assessment (EIA) and Environmental Auditing.

Siting of an industry will have an important effect on its subsequent environmental impact. It is acknowledged that industrial activities produce physical and social changes. Ignoring this fact in Jordan has caused several industries to be sited where they caused adverse environmental impacts on the surrounding environment, especially water resources. EIA is a technique that can be used to integrate environmental considerations into industrial projects. EIA should be carried out early in the planning and feasibility stage so that alternative processes, raw materials, siting options and courses of action can be evaluated and environmental impacts identified and mitigated.

Auditing can be broadly defined as, a systematic evaluation of a environment, safety and health. Auditing can be viewed as a voluntarily approach that benefit industry and the environment and has the advantage of being a pro-active preventive approach rather than a reactive approach to legislation. Industries in Jordan should develop techniques to reduce harmful environmental impacts through audits and assessment of compliance with environmental laws and regulations

Objectives

One. To use EIA as a tool to assist in the identification of potential impacts, and ensure that environmental consideration are taken into account in industrial development projects. Moreover, EIA should be integrated at the strategic planning stage of industrial development projects.

Two. Encourage effective environmental auditing, thus leading to higher levels of overall compliance and reduced risk to human health and to the environment. Auditing serves as quality assurance check to help improve the effectiveness of basic environmental management by verifying that management practices are in place, functioning and adequate.

Three. Adopt policies by industries to enable them to operate responsibly and efficiently based on international environmental management standards. These standards aim at providing organizations with the elements of effective Environmental Management Systems (EMS), which can be integrated with other management requirements, to assist achieving environmental and financial goals. One of the main EMS standards is ISO 14001.

Activities

1. **Develop procedures for proper siting of industry.**

2. **Develop EIA guidelines for assessing the environmental impacts of industrial projects.**

3. **Establish the supportive framework to monitor and implement the appropriate recommendations of the EIA.**

4. **Develop a policy to encourage the use of environmental auditing on consistent nationwide basis, to help achieve and maintain compliance with environmental laws and regulations.**

5. **Encourage participation in international EMS systems such as ISO 14001. Such systems ensure responsible and ethical management of products and processes from the point of view of health, safety and environment.**

6. **Increase research and development of environmentally sound technologies and environmentally sound management systems.**

7. **Use incentives, laws, standards, and more streamlined administration to promote enterprises managed in a sustainable manner and to support training in the environmental aspects of enterprise management.**

Solid waste management is the responsibility of local government and common services councils in the country. The capacities of these authorities to deal with solid waste issues are hindered

Encourage participation in international environmental management systems such as ISO 14001

2.3 MUNICIPAL SOLID WASTE MANAGEMENT

I. INTRODUCTION

Jordan has experienced an increase in the volume of solid waste generation in the last decade. This was the result of the population pressure, industrial development, and new consumption patterns and life-styles. Solid waste management is the responsibility of local government and common services councils in the country. The capacities of these authorities to deal with solid waste issues are hindered

by the lack of financial resources, lack of skilled manpower and lack of community awareness.

II. PROGRAM AREAS

A. MINIMIZING GENERATION OF SOLID WASTES

Basis for Action

The level of municipal solid wastes (MSW) generated in Jordan is relatively high at 0.9 kg per capita per day. MSW are expected to increase with time due to the high annual population growth rate of 3.5% and due to unsustainable patterns of production and consumption. This imposes a heavy burden on the existing solid waste disposal sites. Most of these sites will be exhausted within the next few years, including the Russifeh landfill site which currently serves 2,250,000 inhabitants. Selection of new disposal sites and managing them in an environmentally sound manner will increase the cost of MSW handling and disposal. Thus, the first step in MSW management is to focus on reducing the generation of wastes destined for final disposal by attempting to change unsustainable patterns of production and consumption.

Modify the MSW disposal fees to encourage waste minimization

Objectives

One. To minimize the generation of MSW by inducing beneficial changes in lifestyles, production and consumption patterns through economic and/or other instruments.

Two. To reduce the production and consumption of containers and packaging materials, especially the non-biodegradable ones.

Sorting of the different types of solid waste at sources is essential to facilitate

Activities

1. Establish policies and plans to minimize MSW generation.

2. Undertake monitoring and assessment of the quantity and quality of MSW. Utilise these data to review and update MSW minimization programs and plans.

3. Modify the MSW disposal fees to encourage waste minimization, i.e., the higher the quantity produced, the higher the disposal fees.

4. Provide incentives to reduce unsustainable patterns of production and consumption.

5. Conduct public awareness campaigns with the collaboration and participation of consumers and other non-governmental organizations to promote MSW minimization behaviors and actions. Such actions include reducing the production and use of packaging materials to the maximum extent possible, and replacing the non-biodegradable plastic bags and containers with paper, carton and other biodegradable materials

1st. MAXIMIZING ENVIRONMENTALLY SOUND SOLID WASTE REUSE AND RECYCLING

Basis for Action

As mentioned earlier, it is expected that the cost of MSW disposal will increase due to emerging stringent environmental regulations and the exhaustion of current disposal sites. MSW management will need to promote reuse and recycling to help

minimize waste generation and reduce wastes to be consigned to disposal sites.

MSW in Jordan includes a mix of domestic garbage, plastics, glass, metals in addition to hazardous and non-hazardous medical and industrial solid wastes. Sorting of the different types of solid waste at generation sources is essential to facilitate recycling and reuse. This is not yet practiced in Jordan, and considerable amounts of recyclable materials are sent to final disposal sites. Scavengers collect aluminum soft drinks cans and other metals mainly at final disposal sites. Their work is inefficient and imposes adverse impact on their health

There are about 30 solid waste disposal sites in Jordan of which only 10 are authorized

Objectives

One. To establish and implement programs for efficient separation of different types of solid waste at point of generation to facilitate recycling and reuse.

Two. To establish and implement a national program for solid waste recycling and reuse.

Three. To establish a technical unit responsible for collecting and disseminating solid waste recycling and reuse information and techniques.

Activities

1. **Undertake surveys and monitoring studies of MSW to identify the quantities and types of materials that could be recycled or reused.**

2. **Provide economic and/or other incentives for pilot projects undertaken by small communities to separate and collect different household waste categories in different containers.**

3. **Encourage and provide support for municipalities and/or private sector to build and operate plants that receive the primary sorted wastes at generation sources for further separation and compacting.**

4. **Provide incentives for private sector to invest in recycling industry.**

5. **Formulate and enforce guidelines and standards for waste reuse and recycling.**

6. **Amend standards and specifications to avoid discrimination against recycled materials.**

7. **Initiate, develop and implement public education and awareness programs to promote the use of recycled product.**

8. **Establish a technical unit responsible for collecting and disseminating recycling and reuse information. This unit must be housed in the most capable institution and provided with the necessary financial and technological support.**

9. **Collect relevant information on waste recycling technologies and know-how.**

10. **Collect data and information resulting from MSW monitoring and research studies.**

11. **Establish a data base to facilitate the dissemination of information to target groups.**

C. PROMOTING ENVIRONMENTALLY SOUND SOLID WASTE DISPOSAL AND TREATMENT

Basis for Action

There are about 30 solid waste disposal sites in Jordan of which only 10 are authorized. Environmental concerns are not related only to unauthorized sites, but to authorized sites as well. This is due to the fact that no environmental impact assessments were conducted prior to developing these sites.

The method of disposal in most sites is open dumping. Additionally, disposal sites are not lined to prevent seepage of leachates into groundwater.

Some disposal sites receive medical and/or industrial hazardous solid waste, sludge from wastewater treatment plants and/or liquid industrial waste.

In conclusion, design and operation of most (if not all) disposal sites are not in accordance with environmentally sound practices. Environmental impacts of disposal sites on groundwater, air quality and other environment components raise serious public health concerns.

An EU-funded and UNDP implemented Solid waste management project will be launched in the third quarter of 2000 in the city of Zarka. This project, through its proposed pilot initiative for the Municipality of Zarka and its surrounding areas (Hashimiya, and possibly Russeifa etc.), will address the priorities identified in this document in dealing with solid waste management. The main emphasis will be on waste service coverage, and consequently also promoting waste separation and potential for reuse and recycling.

Objectives

One. To dispose of a continuously increasing proportion of solid waste in an environmentally sound manner.

Two. To establish programs to prevent or mitigate the environmental impacts of the existing disposal sites.

Three. To establish environmental and health quality guidelines and standards governing MSW disposal and to dispose of solid wastes in accordance with these guidelines and standards.

Activities

1. Formulate regulations to enforce segregation of medical and industrial solid or liquid wastes and to prevent these wastes from reaching MSW disposal sites.

2. Enforce treatment and disposal of medical and industrial hazardous wastes utilizing environmentally sound techniques such as disposal of special hazardous waste sites and incineration of medical waste.

3. Close down all illegal solid waste dump sites and rehabilitate and reclaim MSW disposal sites after closure.

4. Replace open dumping in all disposal sites by sanitary landfill

or other environmentally sound techniques.

5. Conduct environmental auditing and environmental impact assessment studies for existing disposal sites in order to formulate strategies and undertake programs aiming at mitigating impacts of pollution.

6. Provide the disposal sites with the necessary machinery, equipment and facilities.

7. Conduct studies to determine the viability of MSW disposal techniques other than landfill such as incineration, anaerobic digestion and composting. Undertake programs to utilize the techniques that are most suitable

density, quantities, etc., based on the results of those studies.

8. Conduct environmental impact assessment studies during the planning phase of selecting new MSW disposal site.

D. EXTENDING WASTE SERVICE COVERAGE

Basis for Action

Enforce the

Solid waste services are available for

principle

population, while the percentage of served population as a nationwide average is approximately 75%. There is a real challenge to extend the services to all people taking into consideration the current coverage percentages and the high growth rate

Enforce segregation of medical and industrial solid or liquid wastes

Safe solid waste collection and disposal services are crucial for public health protection. Without these services public health is endangered as a result of air, water and soil pollution, and waste-related diseases.

Objective

The following objective was identified: To provide financial, technical and human resource capacity-building to empower concerned authorities to extend safe waste collection and disposal services to all people in urban and rural areas.

Activities

1. **Conduct studies and surveys to identify training and equipment needs for safe waste collection and transportation.**

2. **Undertake programs to fulfill identified needs such as providing the collection and transportation equipment and vehicles and providing residential areas with sufficient number of waste collection containers.**

3. **Conduct studies to optimize vehicle waste collection routes. Similar studies are needed to optimize distribution and routing of working groups who collect solid waste from streets, alleys and pedestrian areas.**

4. **Extend waste collection services to all picnic sites, national parks and public recreation areas.**

5. **Encourage adoption of low-cost alternatives for waste disposal. An example is the use of small composting units in remote rural areas.**

6.
principle.

2.4 MANAGEMENT OF HAZARDOUS WASTES

I. INTRODUCTION

Understanding the negative impacts that some chemicals will have on human life and the extent to which these chemicals will effect the environment is becoming a vital issue to many Jordanians. An increased awareness of the importance of the effective management of hazardous wastes, and its role in environmental and public health protection and sustainable development, is steadily mounting. The overall objective of the following program areas is to minimize the generation of hazardous wastes as much as possible and to manage these chemicals

II. PROGRAM AREAS

A. PROMOTING AND STRENG-THENING INSTITUTIONAL CAPACITIES FOR HAZARDOUS WASTE MANAGEMENT

Basis for Action

There is a general lack of data on the quantities and types of hazardous materials that have been disposed of in the environment and the location where they have been dumped.

Hazardous materials are not properly disposed of in licensed disposal sites (which are non-existent) and there are no efforts to estimate the extent of contamination caused by these materials or to propose clean up schemes for the contaminated sites.

Hazardous materials are not properly disposed of in licensed disposal sites

There is no agency able to provide the public or specialists with technical information on hazardous chemicals.

Comprehensive regulations or standards related to hazardous chemicals are not available.

Despite the establishment of the General Corporation for the Environment Protection (GCEP) and the law for the environmental protection (Law No.12 of 1995), the responsibility for implementing several environmental regulations by GCEP interfered with the responsibilities of other governmental agencies or ministries.

Wastes generated from hospitals, laboratories and research centers, such as radioactive materials, chemical solvents, paints, cleaning agents, hazardous materials from local factories and small size industries, are mixed in with the domestic solid wastes, despite the fact that there is no leachate collection systems or monitoring programs for these sites.

Current practices designed to treat and dispose of hazardous wastes are widely violated.

Monitoring programs are needed to determine the extent of contamination by hazardous chemicals and its effect on public health.

There are shortages of sufficiently trained personnel in the areas related to hazardous substances handling, transporting, treatment and disposing of.

No substantial research is conducted in this field in the Jordanian institutions.

There is a need for an emergency plan in case of hazardous chemical spills or accidents.

There is a lack of awareness programs to educate the public on hazardous wastes.

Objectives

One. To adopt appropriate coordinating, legislative and regulatory measures at the national level for the environmentally sound management of hazardous wastes.

Two. To establish public awareness and information programs on issues related to hazardous waste.

Three. To establish comprehensive research programs on hazardous waste and to develop local capacities for this research.

Four. To promote effective management of the risks associated with hazardous wastes.

Activities

1. **Prepare a national profile to assess the national infrastructure for management of chemicals.**

2. **Construct a hazardous waste landfill at Suaqa.**

3. **Establish & strengthen national programs for the sound management of chemicals including:**

adequate legislation;
information collection and dissemination;
build capacity for risk assessment and interpretation;
establishment of risk management policy;
build capacity for implementation and enforcement;
build capacity for rehabilitation of contaminated sites and poisoned persons;
effective education programs; and
build capacity to respond to emergencies.

B. PROMOTING MINIMIZATION AND PREVENTION OF HAZARDOUS WASTE

Basis for Action

Minimize the generation of hazardous wastes as part of an integrated production approach

Management of hazardous substances is costly, and thus minimization and prevention of hazardous wastes must have the first priority.

With the current technological and economical resources in Jordan, management of hazardous wastes in an environmentally sound matter is not possible.

No hazardous waste landfill is yet available in Jordan.

There is a general lack of knowledge and information on the economics of prevention and

management of hazardous wastes.

There have been no substantial efforts to change the industrial processes and consumption patterns through pollution prevention and cleaner production strategies.

Objectives

One. Minimize the generation of hazardous wastes as part of an integrated production approach.

Two. Optimize reuse and/or recycling of the residues of the production processes;

Three. Enhance knowledge and information on the economics of prevention and management of hazardous wastes.

Intensify the exchange of information on chemical safety

The import of some hazardous substances has been an area of concern

There is a potential for high levels of radiation due to the nuclear programs in the neighboring countries

Activities

1. Modify standards or specifications in order to promote the use of recycled materials that are environmentally sound.

2. Establish research programs to stimulate industrial innovation towards cleaner production methods with emphasis on alternatives that are economically viable for local industries.

3. Establish centers or departments for the transfer of environmentally sound technologies and technology assessment.

4. Create networks to provide training and information on environmentally sound technologies.

5. Start programs for regional and international cooperation in monitoring the effects of the management of hazardous wastes.

C. INFORMATION EXCHANGE ON HAZARDOUS SUBSTANCES AND CHEMICAL RISKS

Basis for Action

There is a need for information exchange on the benefits and risks associated with the use of chemicals, in order to enhance the sound management of hazardous chemicals through the exchange of scientific, technical, economic and legal information.

The import of some hazardous substances that have been banned in producing countries has been an area of concern.

Available information is inadequate for insuring the safe use, control, distribution, storage, formulation and disposal of restricted chemicals.

Objectives

One. Intensify the exchange of information on chemical safety, use and emissions among parties involved.

Two. Achieve full participation, including mandatory participation, of all parties involved in the management of hazardous wastes.

Activities

1. **Create national chemical information systems and improve**

access to existing international systems.

2. **Create programs to disseminate knowledge on restricted or banned chemicals and to provide data necessary to assess risks to human health and the environment associated with possible alternatives.**

3. **Establish programs to produce a core of personnel trained in the management of hazardous substances and chemical risks.**

D. PROMOTING AND STRENG-THENING INTERNATIONAL COOPERATION IN THE MANAGEMENT OF TRANS-BOUNDARY MOVEMENT AND PREVENTING ILLEGAL TRAFFIC OF HAZARDOUS WASTES

Basis for Action

There is a need to harmonize existing criteria for identifying hazardous wastes and the procedures used in various international and legal instruments.

There is a lack of monitoring systems in Jordan.

There is also a lack of awareness programs to promote the use of a precautionary approach to the control and monitoring of transboundary movements of hazardous chemicals.

Objectives

One. Promote the development of control procedures for the transboundary movement of hazardous wastes.

Two. Prohibit the export of hazardous wastes to countries that do not have the capacity to deal with those wastes in an environmentally sound way.

Activities

1. **Develop clear guidelines for the identification of hazardous wastes at the national level, taking into account the existing international criteria - and, where appropriate, regionally agreed criteria - and prepare a list of hazard profiles for the hazardous wastes listed in national legislation.**

2. **Develop and use appropriate methods for testing, characterizing and classifying hazardous wastes and adopt safety standards and principles for managing hazardous wastes in an environmentally sound way.**

3. **Formulate regional agreements regulating the transboundary movement of hazardous wastes.**

4. **Set-up systems for monitoring and surveillance of the transboundary movements of hazardous wastes.**

E. SAFE AND ENVIRONMEN-TALLY SOUND MANAGEMENT OF RADIOACTIVE WASTES

Basis for Action

Nuclear applications in Jordan span the fields of medicine, research,

Establish emergency plans for radiation and nuclear accidents

agriculture, water, industry, mineralogy, etc. Radioactive wastes although produced in small quantities from these applications, need stringent disposal measures. Plans are underway to start a Jordanian nuclear program that will include the construction of a nuclear reactor. There is a potential for high levels of radiation due to the nuclear programs in the neighboring countries, especially in Israel, where nuclear accidents are anticipated.

Nuclear accidents are very likely to occur in the nuclear reactors or nuclear programs in the neighboring countries, especially Israel. There is a need for a national emergency plan in case of nuclear or radiation accidents.

License 2000 sites and 3000 workers in the radiation field

Monitoring programs are needed to determine the radiation levels all over the kingdom, especially in areas adjacent to the Israeli nuclear reactors, as well as a comprehensive survey to identify areas with non-ionizing radiation levels detrimental to public health.

There is a shortage of well-trained personnel in the areas related to radioactive substances handling, transporting, and management in general.

There is a lack of detailed specifications and standards to regulate the radiation levels from electrical and electronic devices locally made and radiation levels from wastes in the work environment.

No substantial research is conducted in this field in Jordanian institutions.

There is a lack of awareness programs to educate the public on handling radioactive waste or responding to radiation accidents.

Objectives

Ensure that radioactive wastes are safely managed, transported, stored and disposed of, with a view to protect human health and the environment, and be prepared to avoid or minimize the negative impact of nuclear accidents.

Ensure that pollution prevention and waste-minimization techniques are adhered to

Activities

1. Monitoring and Emergency:

and nuclear accidents

k for monitoring and alarm stations all over Jordan

2. Research and Studies:

Jordan

sources of radiation

materials, e.g. Radon.

3. Information:

Center

radiation sources, incidents, medical

4. Records and exposure levels:

nuclear program.

5. Facilities and Laboratories:

es

and measurements

radioactive wastes

6. Physical Health:

to measure low and high levels of radiation exposure

7. Licensing and Inspection:
00 sites and 3000

Provide consultancy for protection

quality control in nuclear medicine and radio frequency.

8. Regulations:

and Radiation Protection Law No.14 ,1987 into the new Law for the protection of the Environment. No 12,1995.

radiation safety

9. Human Resources and Need for Capacity Building:

establishments (workshops, scholarships, site visits, etc.)

10. Follow-up: Initiation of a national committee from the different sectors of Jordan.

11. Strengthen the capacity of GCEP and the Ministry of Energy and Mineral Resources/ the Directorate of Nuclear Energy to implement the activities described above.

Strengthen the capacity of the concerned institutions to implement the safe and environmen-tally sound management of radioactive wastes

2.5 AIR QUALITY CONTROL

A. INTRODUCTION

During the period between 1980 and 1997, the emission of five principle pollutants increased significantly in Jordan. These five pollutants are: particulate matter (TSP &PM10), sulfur dioxide (SO2), carbon monoxide (CO), nitrogen dioxide (NO2), and lead (Pb). Article (18) of the Environmental Law No.12/1995, provides the framework for pertinent organizations to protect air quality. The article also describes the role of the GCEP in the field of air protection. GCEP is currently paving the way for the development of relevant regulations and guidelines as a means of implementation instruments for Article (18).

II. PROGRAM AREAS

A. ESTABLISHING AMBIENT AIR MONITORING & ASSESSMENT NETWORK

The purpose of the Ambient Air Monitoring & Assessment Network is:

- to judge compliance with and/or progress made towards meeting ambient air quality standards (JS 1140/1996);
- to observe pollution trends throughout the Kingdom, including non-urban areas;
- to provide a database for research and evaluation of effects on urban management and land-use and on transportation planning;
- to develop and evaluate abatement strategies; and
- to develop and validate diffusion models.

The Network should be designed to meet four basic monitoring objectives:

- determine highest concentrations expected to occur in the area covered by the network;
- determine representative concentrations in areas of high population density;
- determine the impact on ambient pollution levels of significant sources or source categories; and
- determine general background concentration levels.

Formulate guidance for the identification and selection of monitoring stations to cover all vulnerable areas in the Kingdom

Monitoring of air quality is carried out occasionally and contractually in certain parts of the Kingdom

Basis for Action

There is a lack of coordination and integration among the institutions involved in air quality monitoring and assessment in the Kingdom.

Monitoring of air quality is carried out occasionally and contractually in certain parts of the Kingdom; thus lacking continuity and comprehensive coverage of pertinent areas around the country.

Steady rapid population growth and the consequent increase in the number of vehicles and energy consumption in the Kingdom have led to severe deterioration of air quality in many areas / locations around the country.

Rapid industrialization, which led to the overlap of industrial and craft areas with residential and commercial areas, has also contributed to poor air quality in those areas.

Objectives

One. Designate and strengthen a specific national agency / institution responsible for monitoring and assessing, and for ensuring the quality of environmental data collection and assessment meets the requirements for informed decision making.

GCEP, in coordination with concerned national institutions, has recently prepared the Stack Emissions Standards (JS:1189/1998) and the Ambient Air Quality Standards (JS:1140/1996).

Two. Formulate guidance for the identification and selection of monitoring stations to cover all vulnerable areas in the Kingdom.

Three. Produce documents to guide implementation of air quality monitoring networks with the aim of providing information and guidance on sampling procedures, analysis, evaluation and reporting of ambient air monitoring information to GCEP.

Activities

1. **Review all national institutions involved in air quality monitoring to determine their capabilities in this area.**

2. **Provide the most capable institution with the needed equipment and technical support along with the necessary financial requirements to carry out its functions.**

3. **Commission the said institution to act as the "technical arm" for GCEP to conduct the monitoring and assessment activities comprehensively and regularly in all parts of the country.**

4. **Establish effective coordination, communication, training, and cooperation with the said institution to produce the best results possible**

5. **Form a committee to review air pollution episodes / incidents in Jordan, and identify areas of importance, using population density distribution and industrial and agricultural activities as a measure, as well as all relevant studies and projects conducted by concerned parties on the subject.**

6. **Form a special technical committee entrusted with addressing specific subjects as follows: program management; program description; data quality objectives; sampling design; sampling methods requirements; sample handling and custody; analytical methods requirements; quality control requirements; instrument/equipment testing; instrument calibration; inspection/acceptance for supplies; data acquisition requirements; data quality management; assessments and response actions; reports to management; data review/verification requirements; validation/verification methods; reconciliation with data quality objectives.**

Encourage and expand utilization of renewable energy resources

Encourage the use of public transportation

B. NATIONAL CONTROL & ABATEMENT MEASURES

Basis for Action

Several air pollution sources including mobile and/or stationary ones contribute substantially to the deterioration of air quality in many areas of the Kingdom.

Energy generation in the thermal power plant, oil refinery activities and Khirbet Al-Samra wastewater treatment in the Hashimyeh/Zarqa area contribute to elevated levels of sulfur dioxide (SO2), hydrogen sulfide (H2S), nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), and carbon dioxide (CO2), all of which adversely affect the inhabitants of these areas.

Transportation, as a major source of air pollution in Amman and other major cities, contributes to nitrogen oxides (NOx), carbon monoxide (CO), lead (Pb), sulfur dioxide (SO2), hydrocarbons (HC), ozone (O3) and carbon dioxide (CO2) levels.

Several industries contribute to elevating dust levels in the country; these may include phosphate mining, quarrying activities and cement. Other industries such as iron & steel, chemical, and tannery contribute to odor problems and other gaseous pollutants.

Wastewater treatment plants and solid waste disposal sites have a major impact on the air quality via emitting odor, CH4, and H2S.

Objective

The following objective was identified: Air pollution control &

abatement in the energy, industrial, transportation and other sectors.

Activities

1. **Encourage and expand utilization of renewable energy resources: solar, wind, and gas generation from solid waste sites.**

2. **Enforce production and use of high quality fuel (including low sulfur content in diesel and fuel oils).**

Apply land-use-planning strategies

3. **Conduct Environmental Impact Assessments (EIA) in the initial planning phase of the newly established power plants, industrial factories, wastewater treatment plants and solid waste disposal sites.**

4. **Conduct environmental auditing and pollution prevention through waste minimization assessment for existing activities.**

5. **Apply land-use planning strategies prior to the establishment of large scale industrial estates.**

6. **Promote the application of clean-technologies and the adoption of environmental management systems, e.g., ISO 14001, as vehicles for better environmental management.**

7. **Enforce the "polluter- pays principle".**

8. **Conduct occupational health inspection procedures including health checks on inhabitants in vulnerable industrial areas.**

9. **Enforce air pollution standards including stack emission standards and enforce the installation of air pollution control equipment at industrial sites.**

10. **Establish preparedness and emergency plans to deal with incidental releases of toxic material to the atmosphere.**

11. **Encourage the use of public transportation and improve the transportation network linking Amman and all major cities in the Kingdom.**

12. **Promote construction of tunnels and ring-roads to minimize traffic congestion in Amman and other major cities.**

13. **Expand environmental public awareness campaigns to include automobile traffic regulations.**

14. **Promote and enforce disposal of medical waste by means of incineration.**

15. **Establish mechanisms to control occasional fires such as tire and waste burning.**

16. **Encourage tree planting and expansion of green cover, in addition to accelerating the paving of new roads in all areas to minimize dust problems in the country.**

17. **Increase public and farmers' awareness regarding the need to limit the use of agro-chemicals in all areas of the country.**

18. **Prevent smoking on public transportation, and designate non-smoking areas in all public facilities.**

19. **Establish regulatory instruments to enforce rehabilitation and reclamation of mined areas and quarries.**

C. PREPAREDNESS AND EMERGENCY PLANS

Basis for Action

There is a lack of comprehensive emergency planning and preparedness on the national level.

There is poor understanding of the kind of hazards that might occur with regards to sudden releases of hazardous substances (pollutants), and the consequent risks they may pose for local communities.

The Ozone Unit at GCEP has played an effective role in the last few years. The Unit has prepared about 15 sub-projects for phasing out ozone depleting substances in different industries in Jordan.

Develop plans for preventive action and intervention

The Ozone Unit is currently conducting the climate change project which is mainly concerned with minimizing Green House Gases (GHG) emissions from different sources in the Kingdom. The Unit has conducted a major

Objective

The following objective was identified: Produce guidance on local emergency and preparedness plans for catastrophic releases of hazardous substances (pollutants) to the atmosphere.

Activities

1. **Form a committee to review existing plans that may have been prepared by concerned authorities/ departments.**

2. **Assess response capabilities of industry and community; this may be carried out in several ways depending on the outcome of activity (1). Hazard analysis for airborne releases of hazardous substances and coordination with existing plans will be necessary.**

3. **Develop plans for preventive action and intervention.**

4. **Seek plans that are concurrent with the Civil Defense Directorate and others concerned authorities.**

D. GLOBAL COMMITMENTS IN THE FIELD OF ATMOSPHERIC PROTECTION

Basis for Action

Jordan is a signatory of the Vienna Convention, Montreal Protocol, Copenhagen and London Amendments regarding Ozone layer protection. Jordan's consumption of Ozone Depleting substances (ODs) is estimated at 1000 tones/year; thus its consumption is less than 0.3 kg/yr./capita.

Objectives

One. Pursue phasing out ODS in different industries to reach the minimum amounts by the year 2006.

Two. Reduce GHG emissions to reach the estimated 1990 levels by the year 2023.

Activities

1. **Control the gradual import of ODS.**

2. **Propose further sub-projects for phasing out ODS and submit them to the Montreal Protocol implementing agencies.**

3. **Complete the LPG production project at JPR.**

4. **Enforce the use of non-ODS and low-ODS in all industries in the country.**

5. **Establish the halon bank to serve the necessary needs.**

6. **Continue the inventory process for GHG emissions.**

7. **Initiate measures and propose projects for the reduction of GHG emissions in various fields (energy production, fuel combustion, agriculture and others).**

8. **Utilize GHGs emitted from solid waste sites.**

9. **Increase GHG sinks by increasing the green cover.**

The development of Aqaba over the years has brought threats to the marine environment

2.6 MANAGEMENT OF COASTAL ZONES

2.6.1 GULF OF AQABA

A. INTRODUCTION

Aqaba is Identify and assess coastal zone the sea resources

nly access to the sea; its shoreline is a stretch of about 26 km. The city has witnessed progressive development of its port

to a busy city of more than 69,000 inhabitants (1998). The development of industry, tourism and transport has brought about economic advantages, but also has adverse impact on the environment, natural resources and the population; The environmental characteristics and resources of Aqaba are influenced by the development activities in the economic sectors, and by the pollution that follows.

The Aqaba coastline contains a very highly diverse marine environment, including the coral reefs. Being the only sea outlet for Jordan, the port of Aqaba has witnessed development of diverse activities; industry and tourism competed to develop the coastline, while port facilities grew to meet the export/ import demands. The Aqaba Regional Authority has developed its own action plan on the environment.

The following program areas are to be considered in line the Aqaba Action Plan (APP):

II. PROGRAM AREAS

A. INTEGRATED COASTAL ZONE MANAGEMENT AND MONITORING (TERRESTRIAL AND MARINE)

Basis for Action

The Gulf of Aqaba has a unique biological diversity, which makes it a global priority for preservation. The Gulf is semi-enclosed, a factor that contributes to its rich and unique marine ecosystem, but also results in limited water exchange with the Red Sea. Therefore, it has a low potential for the dispersion of oil and other contaminants. This aspect of confinement and concentration of pollutants is particularly acute in the Jordanian Portion of the Gulf. The

port city of Aqaba and the unique marine environment in the Gulf is of crucial importance to the national interests.

However, the development of Aqaba over the years has brought threats to the marine environment such as the construction activities along the shoreline, the phosphate dust during transport and loading/ unloading, ship movement, and population growth. The Aqaba Regional Authority has taken steps towards alleviating some of their problems. However, continued and systematic efforts are needed for the control of the marine environment. Some issues are to be resolved:

Lack of coordination and integration among the institutions involved in marine environment quality monitoring and assessment in the country, which led to the fragmentation in the management of the Coast.

The continuous rise in harbor activities, and consequent increase in the deterioration of marine environment quality.

The rapid industrialization which led to the overlap of industrial and craft areas with residential and commercial areas also contributed to poor quality to the marine environment in the same areas and imposed difficulties in the management and control.

Integrate protection of the environment into relevant development policies

Objectives

One. Provide for an integrated policy and a decision-making process.

Two. Control land-based pollution.

Three. Control Sea-based pollution.

Four. Strengthen capacity for control.

Activities

1. **Encourage involvement of diverse sectors, promoting compatibility and balancing uses.**

2. **Assess existing and projected uses of coastal zone (marine and terrestrial).**

3. **Identify and assess coastal zone resources.**

4. **Require EIA for all development activities**

5. **Strengthen monitoring programs for air water and coral reeves, including data accessibility.**

6. **Enhance and increase public awareness on environmental issues.**

7. **Monitor the dust emissions from the phosphate handling facilities in the Main Port and in the Southern Port.**

8. **Enhance control of beach recreational activities and patrolling and control the wastewater treatment system, dumping of litter, garbage and tires into sea.**

9. **Conduct clean-up campaigns of the shoreline.**

10. **Conduct auditing of the Power Plant on the southern shore.**

11. **Control oil spills, waste disposal (liquid & solid) into the sea.**

Strengthen the Department of Environment at the Aqaba Regional Authority

12. **Establish monitoring programs on sea currents, seawater quality, phosphate fallout, alga growth and ship activities.**

13. **Strengthen the capacity of the Department of the Environment at ARA to prosecute violators.**

14. **Coordinate and cooperate with national authorities (GCEP).**

15. **Participate in regional and international programs for protection of marine environment in Aqaba.**

B. CONTROL OF URBAN-RELATED POLLUTION ACTIVITIES

Basis for Action

Urban infrastructure requires continued upgrading and expansion

Aqaba has developed from a small town to a busy city of about 69,000 inhabitants. The city is expected to continue expanding, as more developments occur in the industrial, tourist and transport sectors. The city planners have prepared programs for rehabilitation of the old quarters and surrounding slum areas. However, all development activities are influencing the natural resources and the environment, and may adversely effect the public health. Key issues to be considered:

Urban infrastructure requires continued upgrading and expansion.

The transport system (especially truck movement) causes road hazards, air pollution and leaves unwanted tires as waste.

Tourist expansion has negative impacts on the coastal environment.

Objectives

One. Integrate protection of the environment into relevant development policies.

Two. Improve living conditions for all quarters.

Three. Control of solid and liquid wastes in an environmentally sound manner.

Four. Control of ambient air quality.

Five. Enhance public awareness.

Six. Strengthen the Department of Environment at the Aqaba Regional Authority.

Activities

1. **Include environmental issues into the economic development plans.**

2. **Require EIA for all development projects: industrial & tourist.**

3. **Audit all major industries in the area.**

4. **Establish monitoring programs on water, air and soil.**

5. **Provide for green areas in the city.**

6. **Support social & recreational facilities.**

7. **Promote minimization and recycling of wastes (solid & liquid).**

8. **Improve and expand waste collection services (for solid waste & sewerage)**

9. **Upgrade and expand wastewater treatment plant.**

10. **Improve the dumpsite for solid waste.**

11. **Provide for coordination to control other wastes; e.g. tires; gypsum.**

12. **Establish monitoring program (network) for air quality for dust pollution from phosphate handling at main port and southern port and from traffic (truck, buses, other); including noise monitoring.**

13. **Establish ambient air quality regulations and emission regulations.**

14. **Conduct awareness campaigns to the general public on issues related to environment.**

15. **Train environmental personnel to improve knowledge and skills on a continual basis.**

16. **Encourage coordination within ARA and with other departments.**

17. **Initiate measures for urban pollution prevention (litter, tires, oil spills).**

Establish a mechanism for early warning system

C. PREPAREDNESS AND EMERGENCY PLANS

Basis for Action

The hazards and dangers of accidents are many, and a state of emergency might arise. At the moment there is lack of comprehensive emergency planning and preparedness. In addition, there is a poor understanding of the kinds of hazards that might exist with regards to sudden release of hazardous substances (e.g., oil spills), and the consequent risks that may be imposed on the environment and for the inhabitants.

Objective

The following objective was identified: To formulate local emergency and preparedness plans for hazardous substances to the marine environment, and for other emergencies on land.

Activities

1. **Coordinate with all concerned authorities in preparing emergency plans to deal with oil spills and other industrial accidents.**

2. **Establish a mechanism for early warning system.**

3. **Strengthen cooperation with the local and national agencies.**

4. **Strengthen relations with the regional and international programs.**

5. **Establish a forum for exchange of information and training.**

6. **Conduct training of parties involved in emergency response.**

The Dead Sea has a unique topography and geology and is the lowest place on earth.

2.6.2 THE DEAD SEA

A. INTRODUCTION

The Dead Sea is characterized by a number of factors, some of which bear a potential for development, while others are constraints on any development. The Dead Sea is highly saline (280 gm/kg as

has a unique topography and geology, and at Sea Level of (- 410 m /Nov 1996) is the lowest place on earth. However, there are resource constraints that can affect the progress of development, it has a fragile environment that may not sustain the ambition and plans of developers.

Little development has occurred on the Eastern Shore of the Sea. In the more recent years, as the prospects of ending the conflicts and establishing peace have improved, new opportunities for development are now emerging.

The Dead Sea is already under stress; reduced inflow from the Jordan River over the years took its toll from its surface area and its water

The mineral activities at the southern part of the sea provide economic benefits to the country; the mineral content of the seawater and mud has a potential as resource material and as a therapeutic value. The potential for tourism is there: the sea itself, the rugged terrain and the archaeological sites. However, the Eastern Shore of the sea remains relatively poor and underdeveloped.

The situation is now changing. The Jordan Valley Authority (JVA) has already a master plan for the area with flexibility within the Suweimeh and Zara areas to accommodate proposals by the private sector. The master plan forecasts the construction of 15,000 rooms and 18,000 housing units along the 60 kilometers beach stretch by the year 2010. Moreover, an extension project is being considered for the Suwimeh area that will cover about (1600) dunums and provide approximately 3305 bed units distributed over hotels (400 bed units), pensions (685 bed units), chalets (1000 bed units), tourist villages (600 bed units), youth campsite (620 bed units).

A master plan for the Eastern Shore of the Dead Sea has been proposed

Additionally, there will be general service and recreational facilities, public parks, car parking, commercial centers, public beaches and natural health centers.

The following program areas are proposed for consideration, listed with objectives and activities, to allow for and guide the development process to proceed on a sustainable basis:

II. PROGRAM AREA

A. INTEGRATED PLANNING AND MANAGEMENT OF INFRASTRUCTURE

Basis for Action

The area bordering the North Eastern Shore of the Dead Sea, comprising three small settlements of about 3,250 population, is underdeveloped, poor and has limited resources. The area also contains a number of archaeological sites, some are partially uncovered, and some still need excavations. The area is marked for development for

the eastern shore of the Sea has been proposed earlier by JVA; the

development plan calls for a complex of tourist facilities, ranging from hotels, chalets to shopping, recreational and service centers. An extension of the development plans has been recently reviewed and assessed (EIA prepared in February 1998). The development requires provision of the basic services for the new community. Therefore, a lot of activities are going to take place, during the construction and the operation phases. A number of issues should be considered in the planning and operation of the tourist complex:

The area has limited water resources as well as other natural resources. Provision of water and sanitation should cover the local population.

The area has many archaeological sites of varying importance, which will be negatively impacted as a result of the development of the projects in its various stages of construction and operation.

The local inhabitants are poor; the socio-economic development of the local communities is essential for the sustainability of the resources in the area and the development plans.

Objective

The following objective was identified : Protection of the environment and public health while developing the tourist sites and the Dead Sea resources.

Activities

1. **Establish protected areas for sources of drinking-water supply.**

2. **Provide sanitary collection and treatment of sewage.**

3. **Reduce water losses in distribution systems and at facilities and enhance awareness on water issues.**

4. **Establish adequate systems for reuse of treated wastewater.**

5. **Establish adequate control and monitoring systems for the water/ wastewater/ reuse.**

6. **Provide collection and treatment for all wastewater, with appropriate treatment for intended reuse.**

7. **Establish monitoring and data collection on the shoreline and water of the Dead Sea.**

8. **Provide adequate collection of solid wastes.**

9. **Upgrade and expand the final solid waste disposal sites.**

10. **Integrate provision of adequate water/sanitation services to the local communities.**

11. **Establish linkages with the JVA plans and the community local waters.**

12. **Assist local service providers and coordinate with NGOs, projects, e.g. Quality of life.**

13. **Establish a monitoring program for air quality control.**

14. **Adopt environmental criteria for air quality, wastewater reuse, etc. to suit local environmental characteristics.**

Promote the aesthetic blending of the planned development with the

15. **Incorporate health and safety aspects in design, construction of infrastructure components: such as water, sewerage, road and sanitation (Solid Wastes) systems.**

16. **Strengthen the rural water supply and sanitation.**

17. **Increase hygiene education.**

18. **Increase efficiency and productivity in agricultural water use.**

19. **Support the appropriate use of relatively brackish water for irrigation.**

20. **Establish biological, physical and chemical water-quality criteria for agricultural water users.**

21. **Minimize soil run-off.**

22. **Prevent contamination of water sources with animal excrement.**

23. **Minimize adverse effects from agricultural chemicals, by use of integrated pest management.**

B. PROTECTION AND CONSERVATION OF THE NATURAL AND CULTURAL HERITAGE

Basis for Action

The North-Eastern area shore of the Dead Sea has a long history of settlement. There are many known sites of archaeological significance, and it is very likely that many other buried sites exist throughout the area. Some sites are already disturbed, whether by looting, illicit digging or encroachment and leveling for agriculture. The proposed development plans for the area will most probably damage the sites, if due consideration is not given in the planning and construction phases.

The eastern coastline of the Dead Sea has witnessed few development activities A coastal road had been built few years agoThe area is characterized by a natural beauty, with a number of wadis opening into the area. Therefore, actions are required for preserving and enhancing the physical and the aesthetic elements of the natural heritage.

Objectives

One. Conserve the archaeological sites.

Two. Protect and conserve the natural heritage.

Activities

1. **Coordinate and conduct archaeological investigations/soundings for the area under consideration.**

2. **Collaborate with concerned departments to carry out archaeological excavations.**

3. **Require EIA for each project element of the master plan.**

4. **Develop and implement a plan for conserving known archaeological sites, and for exploration of other sites.**

5. **Ensure that development plans, agricultural and others do**

Survey and identify fauna and flora of the areas marked for development

not infringe on archaeological sites.

6. **Ensure that construction activities do not damage the archaeological sites.**

7. **Ensure proper disposal of all wastes during the construction phase.**

8. **Ensure proper collection and disposal of all solid wastes generated in the operational phase.**

9. **Expand and upgrade the solid waste disposal site.**

10. **Coordinate and carry out tree planting.**

11. **Promote the aesthetic blending of the planned development with the natural features of the area.**

12. **Survey and identify fauna and flora of the areas marked for development.**

2.7 PUBLIC HEALTH

I. INTRODUCTION

In spite of the pressures from increased population growth, the Ministry of Health has succeeded in providing health services to the whole population.

Primary health care centers are distributed geographically to meet the needs and to improve the well being of the urban and rural dwellers. Of these 1161 health care centers, 273 are located in the Amman area. Thus, 50% of the population located in the Amman area are served with only 23% of the primary health care centers. This leads to overloading of these centers and to decreased efficiency of service. Both efficiency of those centers, as well as, the qualities of the care they provide needs improvement.

Mothers and children suffer from dietary deficiencies such as iodine and iron deficiencies

It is thought that insufficient qualification of the paramedical personnel and sometimes-unsuitable premises are the reasons behind the poor care provided. In 1997 there were 75 hospitals in Jordan with a capacity of 8129 beds. Out of these hospitals, the Ministry of Health owns 22 with a capacity of 3207 beds (39.5%), 43 hospitals are privately owned with a capacity of 2629 beds (32%). The rest are owned by the military health services (9) hospitals with 1731 beds (22%) and one hospital owned by the University of Jordan with 506 beds (6.2%). The number of people per hospital bed is 555.

Scarcity of fresh water resources is the major constraint to sustainable development in Jordan and to environmental health promotion. However, Jordan has been able to control most of its infectious diseases and has reached very good health indicators compared to other developing countries. Rapid industrialization is now bringing new health problems associated with increased pollution and exposure to toxic chemicals. This is evident when examining the major causes of death, which are cardio-vascular diseases, respiratory diseases and neoplasm. This shows that the epidemiological profile trends are moving from that of a developing country (predominantly infectious diseases) towards an industrial country profile (chronic diseases as predominant causes of mortality/morbidity: cardiovascular, cancers respiratory deficiencies, mental disorders and accidents).

II. PROGRAM AREAS

A. MEETING THE PRIMARY HEALTH CARE NEEDS PARTICULARLY IN THE RURAL AREAS

Basis for Action

During the last decade, considerable progress was achieved in the health sector in view of the overall strategy

which was adopted and implemented by the Ministry of Health (MOH). This progress was an outcome and result of the intensive programs,

Inadequate geographical distribution of the health

which were implemented especially in the field of Primary Health Care (PHC). In 1995, the number of PHC centers was 1084 including 11chest center, 166 dental centers and 287 MCH centers. Progress in the health sector also covered both secondary and tertiary services. The number of hospitals increased by 8 hospitals in two years (1994, 1995), thus increasing the total bed capacity to 7440 beds in all sectors. The private sector is playing a very important role in the provision of the tertiary treatment levels. Out of the new 8 hospital, 5 were built by the private sector. Despite of these achievements and the restless efforts by MOH, some crucial issues remain to be resolved:

Develop a comprehensive and purposeful health information system

Inadequate geographical distribution of the health services especially the PHC services, which are necessary to sustain and promote public health. Out of the 1084 PHC centers, 249 of them are located in the Amman-Zarqa area, which accommodates around 50% of the total population of the country. This means that 50% of the people depend on only 23% of the services affecting thereby the quality of the services rendered to the public.

Decreased efficiency of the health services. It is believed that efficiency of the health centers in providing the necessary services needs to be improved. Decreased efficiency is attributed to both the lack of highly qualified personnel and to the inappropriate premises of some centers.

Rehabilitate and maintain health care facilities

Mothers and children suffer from dietary deficiencies such as iodine and iron deficiencies.

The existing Health Information System in MOH needs support for upgrading and expansion. Accurate and reliable health data are imperative for health assessment and development.

The problem of poor and insufficient information is not bound to health, rather, it encompasses several other fields. The discrepancy between the reported number of deaths and the estimated (more realistic figure) numbers is an important example. Information management in all sectors needs to be improved

Objectives

One. Increase territorial coverage by PHC centers in urban fringes.

Two. Upgrade efficiency of PHC services.

Three. Improve quality of care provided by PHC centers.

Four. Upgrade the comprehensive

Five. Strengthen the national health information system.

Six. Control selected oligo-elements nutritional deficiencies.

Activities

1. Establish additional PHC centers in fast growing urban fringes.

2. Increase the capacity of the existing overloaded PHC centers.

3. Systematically retrain existing paramedical personnel with insufficient qualifications.

4. Systematically rehabilitate and maintain health care facilities.

5. Monitor the coverage of all components of primary health care for the population living in the rural areas and urban fringes.

6. Systematically evaluate, technically and financially, the performance of PHC centers.

7. Improve coordination between public and private health care providers.

8. Mobilize communities for primary health care actions.

9. Develop indicators for comprehensive evaluation of the quality of health care provided.

10. **Improve hygiene and sanitation of health care facilities including safe management of hazardous medical waste and housing conditions (lighting, heating, ventilation).**

11. **Enhance public awareness actions and health education programs at schools.**

12. **Upgrade the technical capacities of CHC centers and selected PHC or MCH to provide for environmental health services such as: water quality monitoring, food hygiene, environmental health education and monitoring of disease vectors.**

13. **Develop a comprehensive and purposeful health information system.**

14. **Strengthen computer facilities for health information processing.**

15. **Improve the existing disease reporting system to include environmentally related diseases.**

16. **Develop proper legislation to implement the reporting.**

17. **Implement and develop the existing iodine deficiency control program.**

B. CONTROL OF COMMUNICABLE DISEASES

Basis for Action

High population growth rates and demographic imbalances have overloaded various services such as safe drinking-water supply and sanitation.

One percent of the population lack basic sanitation provisions and 94% of the treated domestic sewage is reused for irrigation.

One percent of the population lack basic sanitation provisions

Environmentally related infectious diseases are a major health issue, especially in rural areas and slums. They are affected by development and depend largely on the availability of safe drinking water and proper sanitation and waste disposal practices.

In addition, the control of disease vectors and immunization programs are very important factors. About 15.2% of the rural population obtain untreated drinking water directly from wells, springs and other unsafe sources.

Overcrowding and indoor air pollution encourages the spread of acute respiratory infections, which is a major cause of death of children under five years of age. Control programs started in 1992, and they exert a big burden on the health services. The average occupancy rate in the refugee camps and slum areas is 4 people/room and 3.2 people/room, respectively.

A high level of progress has been achieved in the control of communicable diseases, which used to be endemic:

The infection rates for six year old children decreased from 10% to 0.4% for the years 1950 and 1990, respectively. Reported cases of pulmonary and extra pulmonary TB reached 12/100,000 of the population for the year 1991. The introduction of EPT target diseases program in 1979 and vaccination has reduced the mortality rate associated with those diseases. Diarrhea diseases are continuing to decline during the last decade. This can be attributed to the success of the control of communicable diseases program and the overall improvement in the environmental conditions. Indigenous cases of malaria have been non-existent for a

Objectives

One. Eradicate poliomyelitis

Two. Eliminate measles.

Three. Sustain elimination of neonatal tetanus.

Four. Significantly reduce the incidence of three major zoonotic diseases (brucellosis, coetaneous leishmaniasis and rabies).

Five. Reduce the incidence of children diarrhea diseases and case fatality rate of children diarrhea down to be less than 3/1000 cases.

Six. Reduce the incidence of children mortality from pneumonia by one third.

Seven. Reduce case fatality rate from children with acute respiratory infections by 75%.

Eight. Strengthen national efforts to prevent AIDS dissemination in Jordan.

Nine. Implement the program of cardiovascular disease prevention already designed by the Ministry of Health.

Ten. Design and implement a national program of early detection of selected cancers.

Activities

1. **Sustain and consolidate the high immunization coverage achieved for poliomyelitis and measles.**

2. **Improve case management of measles in health care centers and hospitals.**

3. **Attain and sustain a level of almost 100% immunization coverage of infants.**

4. **Encourage hospital delivery and clean home delivery.**

5. **Implement mass immunization of major susceptible animal species especially small**

Illiteracy rate among females is 20.6%.

The health of children is vulnerable to the various environmental factors

Improve and update skills of clinical staff in rural areas

ruminants against brucellosis, and enhance public education regarding handling / processing of milk and milk products and contact with suspect animals.

6. **Implement mass immunization of dogs against rabies and improve human post-exposure delivery system.**

7. **Continue the present program of environmental management to decrease the population of rural rodents (animal hosts of the leishmania parasite) and the disease vector (Phlebotomies fly).**

8. **Establish Oral Re-hydration Therapy (ORT) centers in primary and comprehensive health centers and hospitals emergency rooms in the country, including rural and peripheral areas. Priority should be given to overloaded centers, which receive most of the patients with diarrhea, as well as to remote ones. The responsibility for setting-up, running and supervising ORT centers should be clearly defined.**

9. **Improve and update skills of clinical staff in rural areas and peripheral areas through training programs. Such programs should target all health workers with responsibilities for diarrhea case management. The knowledge and skills required for proper case management should be thoroughly discussed, explained and practiced during training sessions, and supported by supervision. Training should prepare health workers to set-up and effectively run ORT centers. Diarrhea assessment and management subjects should be included in the training program and exams of the Jordan Medical Board.**

10. **Improve housing conditions in refugee camps and slum areas to reduce overcrowding, and improve indoor air quality.**

11. **Continue present immunization programs among children for TB.**

12. **Focus necessary attention to referral care.**

13. **Develop and implement families awareness programs on the need to seek care for sick children.**

14. **Focus Acute Respiratory Infections (ARI) control activities on risk groups (refugee and slum dwellers).**

15. **Adopt an alert plan of action for the surveillance, prevention and control of AIDS.**

16. **Promote healthy lifestyles through health education to prevent cardiovascular diseases.**

17. **Promote early detection of selected cancers.**

C. PROTECTION OF VULNERABLE GROUPS

Basis for Action

About 42.7% (1994 estimates) of the population are infants and children under the age of 14. The infant mortality rate has decreased from 151/1000 births for the year 1961 to 28/1000 births for the year 1994.

This can be attributed to the improvement of health services and education of mothers. Nevertheless, acute respiratory infections, birth trauma, birth asphyxia and communicable diseases remain the main cause of children mortality.

The health of children is vulnerable to the various environmental factors.

Enhance

in improving the health status of families

The rapid urbanization, which leads to socio-economic changes, makes the youth sector a vulnerable group (13.3% of the population are between the age of 14 and 20) to all the problems associated with the encountered changes.

About 48.5% of the population are females and 23% are females between the ages of 15 and 49. The fertility rate has decreased to reach 5.6 births for the year 1991 and it is expected to decrease further to reach 4.01 by the year 2005. This can be attributed to the adequate educational opportunities to women in general.

Illiteracy rate among females is 20.6%. About 15% of the female population participated in the work force for the year 1989.

Forced migrations and rural migrations have created 13 refugee camps and 24 slum areas in addition to rural and pre-urban areas. These areas generally lack proper housing, health services, sanitation and safe drinking-water.

Objectives

One. Reduce infant mortality rate to a maximum of 20 / 1000 live births.

Two. Reduce pre-school children mortality (1 to 5 years).

Three. Prevent exploitation of school-age children as cheap labor.

Four. Prevent unhealthy behavior among adolescents.

Five. Provide total coverage of women of childbearing age with birth-spacing services.

Six.
improving the health status of families.

Seven. Improve health and social conditions in refugee camps and slum areas.

Eight. Facilitate education of disabled children.

Nine. Improve occupational health and safety for workers.

Activities

1. **Reduce infant and pre-schools children mortality rates through the implementation of the general health plan especially, diarrhea and ARI control actions.**

2. **Strengthen prenatal and postnatal care and immunization services in the MCH centers.**

3. **Strengthen women health and knowledge related to breast-feeding, prevention of infections and nutrition.**

4. **Provide health workers with appropriate knowledge and skills**

Implement the -friendly

initiative in all institutions providing maternity care

to promote protect and support breast-feeding.

5. **-**

institutions providing maternity care.

6. **Implement inter-sector programs on domestic accidents and traffic accidents prevention (accidents being the third cause of pre-school children mortality, the first two causes being upper respiratory tract infections and diarrhea diseases, respectively).**

7. **Establish advisory services for adolescents at health centers to provide information on unhealthy behavior (alcohol, smoking, narcotics, and AIDS prevention).**

8. **Strengthen health education of women about birth spacing in all health centers.**

9. **Implement public awareness programs on the role of women in health promotion.**

10. **Strengthen women organizations and associations and neighborhood groups.**

11. **Strengthen PHC and MCH centers in refugee camps and slum areas.**

12. **Establish appropriate facilities in schools for disabled children in cooperation with other sectors.**

13. **Strengthen, in cooperation with other sectors, occupational health and safety services.**

14. **Promote prevention of occupational accidents.**

15. **Control of excessive levels of air pollution in the working environment.**

D. MEETING THE URBAN HEALTH CHALLENGES

Basis for Action

The vast urban growth is attributed to the increased rural migration and the forced migrations in the aftermath of the 1948 and 1967 wars and the 1991 Gulf war.

The demographic imbalances have overloaded the capacity to meet human needs and strained services and exposed the population to environmental hazards.

Environmental pollution, in addition to overcrowding and inadequate housing contributes to the deterioration of the quality of human health.

Objectives

One. Improve housing and environmental health conditions in refugee camps and slum areas.

Two. Mobilize municipal resources for health promotion and environmental improvement actions.

The demographic imbalances have overloaded the capacity to meet human needs

Activities

1. **Collaborate with housing agencies to eradicate slum areas.**

2. **Collaborate with UNRWA to improve environmental health and housing conditions in refugee camps.**

3. **Collaborate with the Water Authority of Jordan to achieve 100% of the urban population connected to piped water supply.**

4. **Collaborate with other sectors to achieve 100% coverage of urban population with appropriate liquid and solid waste disposal services.**

5.

Expand the existing

6. **Extend the healthy cities network at national scale.**

in Zarqa

7. **Collaborate with other Arabic-networks.**

8. **Collaborate with other international urban programs project.**

E. REDUCING HEALTH RISKS FROM ENVIRONMENTAL POLLUTION AND HAZARDS

Basis for Action

Rapid industrialization and urbanization took place during the last decade, meanwhile, health and environmental impact assessment was absent.

Pollution-related health problems are modest, yet pollution is a key issue to be tackled in development strategies, especially the management of hazardous and chemical wastes.

Pollution control, prevention and protection measures have not kept pace with the rapid industrialization and urbanization.

Though some improvement has been achieved, the ability to deal with environmental pollution problems is still limited due to lack of resources, information, best available technologies, follow-up, etc.

The increase in the number of motor vehicles and transportation emissions and the absence of air pollution abatement measures at industries, in addition to open burning of domestic wastes, are major causes of outdoor air pollution.

Respiratory diseases and other health problems among workers can be attributed to unsafe conditions and unhealthy indoor air quality at the workplace.

Dumping of some industrial wastes and toxic chemicals in an uncontrolled fashion in remote areas, and in sewer manholes, etc. threatens the quality of the environment and the public.

Reuse of treated domestic and industrial wastewater, which, if not controlled and monitored properly, can lead to health problems.

Improper disposal of hospital waste that can cause major health hazards to exposed groups of the community.

Poisoning and chemical accidents due to exposure and misuse of toxic chemicals (e.g. pesticides).

Lack of awareness of the potential health risks and environmental hazards associated with the use of chemicals in the industrial, agricultural, commercial as well as domestic sector.

Conduct research to identify the health risks of water rationing

Over pumping of underground water is affecting the quality of water.

Industrial and agricultural pollutants can lead to contaminated food, in addition to the possible use of unsafe food additives and colors.

Objectives

One. Ensure that urban and rural drinking-water quality is in compliance with the stipulated national standards.

Two. Ensure that all Jordanians will have access to sufficient quantity of safe drinking water and proper sanitation.

Three. Ensure that urban solid and liquid wastes will be collected and disposed of through hygienic and environmentally sound processes.

Ensure healthy housing to all Jordanian families

Four. Ensure safe reuse of treated sewage for agricultural purposes.

Five. Prevent food-borne infections and intoxication.

Six. Ensure safe and environmentally sound management of chemical, infectious, and radioactive hazardous wastes.

Seven. Mitigate localized hazardous air problems.

Eight. Assess public health significance of other localized environmental problems such as coastal pollution, vector control, noise and radiation.

Nine. Ensure healthy housing to all Jordanian families, in cooperation with other sectors.

Ten. Prepare, in cooperation with other relevant agencies, emergency plans in case of natural or man-made disasters such as earthquakes, flash floods, wars or major industrial accidents.

Activities

1. **Strengthen the existing drinking water quality surveillance program, especially at rural point sources such as wells, springs, etc.**

2. **Introduce additional parameters in the routine program for piped water quality monitoring. Those parameters to be relevant to chemical micro-pollutants such as soluble pesticides or solvents, which are covered by the WHO drinking-water quality guidelines and are actually used in Jordan. Those parameters may also include heavy metals and by-products from disinfecting water.**

3. **Develop legislation, in cooperation with other relevant sectors, to reduce pollution in the catchment areas of key aquifers with special emphasis on the reduction of use of nitrate fertilizers.**

4. **Conduct research to identify the health risks of water rationing (intermittent pumping of water).**

Establish a national poison control center

5. **Carry out targeted health education actions on domestic hygiene and sanitation.**

6. **Assist in developing a national system for sludge collection and disposal for septic tanks and sewage treatment plants, using anaerobic digestion and drying beds.**

7. **Participate in upgrading the existing or new waste landfilling sites through lining the bottoms with clay to prevent infiltration of leachate, regular covering of fresh wastes to prevent nuisance, exclusion of toxic and hazardous wastes from domestic waste landfill sites, and through venting of the fermentation gases to prevent explosions.**

8. **Monitor the health conditions of the operators of waste dumpsites and sewage treatment plants.**

9. **Ensure the implementation of the newly set criteria for the use of treated sewage and sludge in cooperation with other concerned agencies.**

10. **Conduct monitoring on the quality of treated sewage and the corresponding quality of irrigated crops.**

11. **Introduce biological toxicity test in the national standards to identify industrial wastewater to be discharged into the public sewers.**

12. **Develop monitoring program for chemical contaminants in food.**

13. **Strengthen public health laboratories to enable the analysis of chemical food contaminants.**

14. **Extend and strengthen the existing facilities for the monitoring of microbiological quality of food.**

15. **Strengthen the existing disease surveillance program to include major food-borne diseases.**

16. **Carry out health education actions on safe food storage and preparation.**

17. **Improve the hygienic and nutritional quality of foods sold at street-food stalls.**

18. **Survey the quantity and quality of all kinds of hazardous wastes produced in the country.**

19. **Develop adequate facilities to disinfect infectious medical waste from medical institutions.**

20. **Develop legislation for safe management of clinical and medical wastes.**

21. **Develop a national plan for the safe disposal of hazardous chemical wastes.**

22. **Assist in setting-up legislation on hazardous waste handling.**

23. **Conduct training activities on chemical safety.**

24.

WHO, UNEP and ILO in the framework of the international program on chemical safety.

Develop emergency contingency plans to cope with the possible impacts of disasters

25. **Develop a practical guide in Arabic for the safe and environmentally sound handling of pesticides, in cooperation with other sectors.**

26. **Establish a national poison control center.**

27. **Carryout targeted health education actions to promote chemical safety at home and in agriculture.**

28. **Develop systematic measurements of air quality in areas where excessive air pollution levels are suspected.**

29. **Ensure the implementation of the air quality standard.**

30. **Implement actions to cut down unacceptable levels of air pollution especially in the working environment.**

31. **Assess health impact of coastal pollution in the Gulf of Aqaba.**

32. **Measure noise levels in suspected problem areas.**

33. **Survey potential ionizing and non-ionizing radiation problems using WHO guidance documents.**

34. **Continue the present program on mosquito control to prevent the reintroduction of malaria from neighboring states by replacing progressive pesticide spraying with environmental friendly methods such as environmental management for mosquito control.**

35. **Continue present efforts towards resolving the problem of flies in the agricultural areas, especially in the Jordan Valley.**

36. **Eradicate slum conditions.**

37. **Prevent domestic accidents.**

38. **Promote healthy stoves to cut down indoor air pollution at home during the winter.**

39. **Identify and map human settlements at risk from flash floods and design protective schemes.**

40. **Develop and enforce environmental and health impact assessment procedures for all mining and hazardous industries.**

41. **Develop emergency contingency plans to cope with the possible impacts of disasters.**

Chapter Three

Natural and Cultural Heritage

3.1 NATURAL HERITAGE

3.1.1 PLANT BIODIVERSITY

I. INTRODUCTION

The total recorded number of flowering plants in the country is about 2400 species

The study of wild plants in Jordan is reflected in floras and checklists as well as some taxonomic revisions. These all attempt to identify and characterize the status of wild plant life in Jordan. A number of valuable studies have been done, but many areas of survey and research are still missing, for both flowering and non-flowering plants as well as nonvascular plants such as algae, bryophytes, lichens and fungi.

The total recorded number of flowering plants in the country is about 2400 species. The status of non-flowering plants in Jordan is not yet clear. The recorded number of lichens species is about 150 and about 150 species of Bryophytes have also been recorded so far.

Aquatic plants are found in three habitats in Jordan: marine, fresh water and brackish water. These plants are largely unknown with only a few studies done to date.

The number of Gymnosperms species is quite limited. Three species of *Pinus* are only recorded in Jordan. Other groups of non-flowering plants are the Pteridophytes (ferns), where their status of distribution and the case of species is not resolved yet. It is estimated that Jordan has 5-10 species of ferns.

Plant biodiversity faces the danger of degradation as a result of both man-made and natural factors

Plant biodiversity faces the danger of degradation and loss of many plant species as a result of both man-made and natural factors. Yet serious attempts have been made to protect and conserve the plant genetic resources of the country. Many reserves have been established, but the laws and regulations governing them are not always enforced, and dozens of species are facing dramatic pressure.

Major factors, which can contribute to ensuring conservation, protection and sustainable use of Jordan's plant genetic resources, include:

- the completion of scientific assessment of plant species,
- research into different facets of plant biodiversity,
- public awareness of rare, endangered, medicinal, poisonous, edible or economically valuable plants,
- activation and implementation conservation laws

II. PROGRAM AREA

A. ASSESSMENT AND CONSERVATION OF PLANT BIODIVERSITY

Basis for Action

The status of many species of flowering plants in Jordan is still not clear; much needs to be done to identify and characterize different families in this group.

Many wild terrestrial species, especially those with limited and restricted geographical distribution, such as bulbs, orchids and other rare and endangered species, are degraded and becoming extinct due to both natural factors and human activities. Many aquatic plants, flowering and non-flowering plants are also suffering degradation and extinction in the face of similar pressures.

Detailed ecological studies of

Few general studies have been carried out.

Few studies have been done on the economic or medicinal values of

studies are underway, but still far from completion.

Study and promote the recognition of poisonous, medicinal and edible plants

Natural forest ecosystems need more research especially regarding seed germination, forest regeneration, species density, coverage and distribution, and causes of forest destruction.

Comprehensive studies are needed for different plant groups including flowering plants, gymnosperms, pteridophytes, mosses and lichens. Especially important are studies of biosystematics and the socio-economic values of these plants.

There are no reserves to protect rare and endangered species in the areas with fragile ecosystems, though a number of reserves are established in the country.

Establish a national center for the conservation of germ plasm
Produce Red-Data Book for endangered, rare and extinct plant species

There is no botanical garden in the country. A garden is needed to conserve wild natural plant resources and to maintain the gene pool of wild plant species.

Ongoing destruction of natural habitats causes degradation and disappearance of native, rare and endemic herbs and bulbs, as well as natural forests.

Research to propagate and conserve rare and endangered plants is currently carried out in various research centers including universities. Continuous surveys and experiments to propagate and cultivate other threatened species are also needed. This task needs financial support to cover the cost of the necessary experiments and field surveys.

Objectives

1. Assess the species diversity of wild flowering and non-flowering plants

2. Identify and conserve plant habitats in the different terrestrial and aquatic ecosystems.

3. Determine the status of natural forest ecosystems, the main conservation issues in these forests and the options for managing these areas in a sustainable manner.

4. Identify rare; endemic and endangered native plant species.

5. Produce Red-Data Book for endangered, rare and extinct plant species in the country.

6. Study and promote the recognition of poisonous, medicinal and edible plants

7. Encourage the development of methods and strategies for propagating and cultivating endemic, endangered and rare plants, with special emphasis on the potentialities of the Badia area as a rich source of plant genetic material.

8. Establish a national center or centers for the conservation of germ plasm (e.g., botanical garden, herbarium, national / regional propagation units, seed bank).

9. Adopt a policy to encourage exchange of germ plasms with regional and international institutions.

10. Conduct identification and conservation of aquatic (marine, fresh and brackish water) plants.

11. Establish a special herbarium for algae and fungi.

12. Promote the balance between the conservation and sustainable use of the natural plant resources, by protecting certain areas from cultivation, grazing or other interference, and enhancing the role of these reserves.

13. Improve the protection of vulnerable or threatened habitats or ecosystems.

14. EIA studies should be required of all projects that may affect plant species and their ecosystems.

Initiate a National herbarium and a Botanical garden

Activities

A. Plant biodiversity

1. **Extensive studies should be carried out assess various habitats and ecosystems. These are needed to identify short-term and long-term threats to biodiversity. Such studies should be concerned with:**

Data base
Species distribution in a grid system
Population distribution
Status of species (endemic, endangered, threatened)
Keystone species
Assessment of sustainable use of economic, medicinal and edible plants.
Invasive and alien species.

2. **In order to determine the status of plant biodiversity in the different habitats in Jordan (terrestrial & aquatic), the following actions are needed:**

Continuous monitoring to identify changes in habitats locally and internationally.
Training of manpower able to carry out the previously mentioned duties.
Information should be deposited in a data base bank and linked to a G.I.S. (Geographical Information System).
Ensuring sustainable development plans address issues of plant habitat destruction and conservation.
Initiating a National herbarium/a and a Botanical garden/s.
Establishing a well-equipped national tissue culture unit or propagation center for propagation and regeneration of plant species, facing the threat of extinction
Establishing a national seed or gene bank.

B. Vegetation

Undertake the following studies and activities to monitor and determine the actual status of vegetation in Jordan:

1. **Field surveys related to species diversity, density, coverage and dominance.**

2. **Systematic delineation of total areas using remote sensing.**

3. **Studies of the effect of different economic**

Plant genetic resources are under considerable threat of loss

activities on different types of vegetation.

4. Detailed studies exploring the economic and medicinal potentials and sustainable uses of wild plants in Jordan. These studies should take account of the following aspects: their root-stocks and genetic resources of medicinal, ornamental and poisonous plants.

VVVV. Legislation Issues

There is a lack of governmental legislation to conserve and protect biological diversity, both populations and species, especially rare and endangered wild flowers such as orchids, cacti, bulbs, and other medicinal, ornamental and poisonous plants.

Clear rules and legislation should be issued to control the handling and exchange of genetic resources

Plant genetic resources are under considerable threat of loss and extinction. Rare and endangered specimens in the form of corms, bulbs, seeds, cuttings, etc. are being exported from the country illegally. The international organization (CITES) is monitoring this problem with the co-operation of both the government and NGOs.

The situation in Jordan is very serious with hundreds of specimens removed from the country illegally each year either in the form of living or non-living dry herbarium specimens. In recent years many rare, endemic and even some previously unknown species have been collected and transferred to international herbaria or museums, especially in European countries. This is done without leaving duplicate specimens in Jordan or providing information about the place of collection or other relevant data.

The following measures are top priorities for any national project concerned with the conservation of national genetic heritage or wild plant genetic resources:

1. Clear rules and legislation should be issued by the government to control the handling and exchange of genetic resources.

2. Share benefits should be made clear in contracts with government institution or non-governmental groups interested in using genetically resources.

3. An office should be established responsible for issuing permits for collecting, handling and exporting of genetic resources.

4. An office representing CITES should be established in Jordan.

5. Strict rules should be established to control threats to plant bio-diversity and to protect

penalties should be imposed on those who break the rules and laws of conservation.

6. Reserves have to play more effective roles and be controlled in cooperation with the government.

3.1.2 ANIMAL BIODIVERSITY

(A) WILDLIFE

I. INTRODUCTION

Conserving biodiversity requires conservation of rare and threatened species and habitats. The quality of human life is intimately bound with the maintenance of biodiversity.

In Jordan, the concept of conservation and sustainable use of biodiversity is not very clear for decision-makers and the public in general. There a critical needs to ensure effective integration of biodiversity and habitat protection into sustainable development. This can be achieved by having biodiversity conservation objectives integrated into the policies which drive the major sectors of the economy, such as agriculture, forestry, fisheries, transportation, regional development, energy, land use, recreation and tourism.

Conservation targets will not be achieved without action or recovery plans

Conservation targets will not be achieved without action or recovery plans. Such plans should be produced for all priority species and habitats. They should be soundly based on current scientific knowledge and should specify both conservation targets and the necessary actions to achieve such targets.

Effective action plans for conserving biodiversity in Jordan need to be clearly and precisely set and implemented in order to restore degraded wildlife ecosystems and to regulate and improve the socio-economic practices affecting wildlife.

II. PROGRAM AREA

A. MANAGEMENT AND CONSERVATION OF WILDLIFE AND HABITATS

Basis for Action

Lack of management in recreational areas has led to the destruction of natural habitats

Wildlife biodiversity in Jordan was exposed to serious threats and negative impacts with the introduction of modern vehicles and automatic guns in the beginning of this century. This had caused the extinction of certain faunal species such as the Arabian Oryx. Around the middle of this century, these impacts and threats increased dramatically with the increase in -Israeli conflicts in the region. Threats and impacts on the Jordanian wildlife biodiversity can be summarized as follows:

Illegal hunting.

Forest degradation through tree cutting, fires, encroachment of agricultural lands, overgrazing, soil degradation through pollution and erosion.

Lack of management in recreational area has led to the destruction of natural habitats.

Loss of wetlands.

Lack of public awareness of conservation issues.

Lack of scientific centers specializing in environmental studies and research on wildlife and weakness of inventories regarding fauna and flora in Jordan.

Weakness of legislation related to the protection of game animals and bird and lack of enforcement of existing laws.

Objectives

1. Conserve and manage endemic and relict species and their habitats such sand dunes, the Dead Sea and Jordan River habitats.
2. Rehabilitate endangered and endemic species.
3. Conserve certain types of highly threatened ecosystems such as the desert ecosystem.
4. Conserve and manage Jordanian species and habitats of global significance.
5. Control industrial wastewater discharge in compliance with national and international criteria and standards.

The number of breeds of domestic animals and birds has decreased

6. Minimize negative impacts of local populations and tourists on the biodiversity of tourism attraction sites.
7. Induce new management styles to include management of tourist activities in natural resources.
8. Continue efforts in the management and conservation of endangered species and their habitats in protected areas.

Activities

1. **Review of protected areas including their recreational aspects.**
2. **Identify the status of the habitats and species of the proposed forest and rangeland reserves and other protected areas.**
3. **Produce management plans for the sustainable use of protected areas.**
4. **Update the protected area plans and review the status of the sites to include new sites.**
5. **Monitor protected areas regularly and identify impacts and threats imposed on them.**
6. **Update information on globally important Jordanian species and habitats. Monitor wetlands and their endangered species.**
7. **Set up a research strategy for endangered and endemic species.**
8. **Establish the status of species and habitats according to international standards.**
9. **Monitor the use of agro-chemicals and pesticides affecting endangered species.**
10. **Update the inventory of important birds and wetland areas in Jordan.**
11. **Promote sustainable development and initiate socio-economic projects with local people.**
12. **Promote public awareness and raise awareness of decision-makers and other concerned parties of the importance of wildlife and protected areas.**
13. **Improve legislation and law enforcement issues related to wildlife conservation and management.**

(B) DOMESTIC ANIMAL BIODIVERSITY AND PRODUCTION (LIVESTOCK AND POULTRY)

Basis for Action

Only limited and inconclusive data are available regarding livestock biodiversity in Jordan. The number of breeds of domestic animals and birds has decreased and some breeds have disappeared. Environmental and human factors have played a major role in these developments. Assessment of animal biodiversity in terms of animal numbers, species, breeds, distribution, ecological systems, management methods, disease resistance and susceptibility will have an important impact on both humans and domestic animals.

Animals should only be slaughtered in meat factories and plants

The population of Jordan has increased substantially in the past 25 years and the standard of living has improved. The quantity and quality of animal products such as meat, milk, wool and their by-products do not meet the increasing demand. The levels of imports into the country evidence this. Highly productive animals have also been imported, which has affected the local animal breeds. Some local animal breeds, in addition to their social and cultural value, have unique attributes for adaptation, disease resistance and specific uses. These attributes need to be

preserved. These local breeds are threatened with extinction as a result of the introduction of exotic breeds and of changes in livestock production systems.

Jordan also suffers from shortages of animal feed. The amount of imported feed was 909.8 thousand tons in 1994. Farm level production systems are economically inefficient, with high costs. In many cases, they are also hazardous to the environment.

Local production of lamb meat especially is far below local demand. Yet a large proportion of the rural population depends on income from

is comparatively low.

The need for draught animals in tourist areas and hilly mountainous areas requires conservation of the existing diversity of animals and for appropriate veterinary services. This requires qualified veterinarians and animal scientists to cope with the health of animals and with the changes in livestock production systems, including those used in biotechnology.

1. PROGRAM AREA

A. Domestic Animals Biodiversity and Production Livestock

This program area covers the following important issues:

Central Diagnostic Laboratories (CDL) should be established

1.Artificial Insemination (AI) and Embryo Transfer (ET)

Embryo Transfer is a new technology which would be very practical in Jordan in the future provided that specialists and trained personnel would be available along with appropriate facilities such as centers and laboratories for semen evaluation and preservation of sperms and eggs or zygotes of

2.Working Animals

Working animals are used for agricultural purposes and as means of transportation in rural areas. They are also used in tourist areas such as Petra, Wadi Rum, Aqaba and the Dead Sea to commute tourists while generating income for their owners. Management, breeding, nutrition and provision of health service for such animals should be evaluated and improved.

3.Slaughterhouses and Meat Production Plants

Animals should only be slaughtered in meat factories and plants with the capacity to minimize negative effects on public health and the environment in general. Automation is needed in such factories, as well as better management and re-use of blood, intestines and other by-products as animal feed. Laboratories for microbiological, chemical and physical testing of meat should be established.

4.Dairy Factories

The status and hygiene level of all dairy factories in Jordan should be studied and evaluated with special focus on health measures and their effects on the environment. Efficiency of milk collection systems needs careful consideration, with special emphasis on training farmers on techniques for keeping milk safe for human consumption.

Establish programs to control diseases and prevent their transmission to humans and animals

5.Feed Factories

Appropriate feed processing systems are needed in Jordan.

6.Reference Diagnostic Laboratories

Central Diagnostic Laboratories (CDL) should be established in Jordan and provided with trained specialists. They should also be connected to regional and inter

waste products should be incinerated or safely disposed off, transported and appropriately stored, especially radioisotopes and radiation bio-hazardous wastes.

7.Effects of Industrial Facilities on Animal Health

The effect of industrial wastes on livestock should be carefully examined and controlled.

8.Quarantine

Quarantines should be established

control the movement of animals and guard their welfare.

9.Veterinary Pharmaceutical Industry

Veterinary drugs are a growing industry in Jordan with twelve factories available. Such drugs should be appropriately evaluated and controlled through the establishment of a central laboratory for their quality control and supervision by trained and qualified personnel in this field.

Objectives

1. Enumerate and describe all breeds of livestock used in animal agriculture, in as broad a way as possible, and begin a 10-year program of action.

2. Establish and implement an action program to identify breeds at risk, together with the nature of the risk, and appropriate preservation measures.

3. Establish and implement development programs for indigenous breeds in order to guarantee their survival, avoiding the risk of their being replaced by breed substitution or crossbreeding programs.

4. Establish and implement development programs in order to guarantee the maximum genetic production capabilities of animals with emphasis on Al-Badia region.

5. Establish and implement action

guarantee the appropriate health conditions and animal products safe for human consumption.

6. Establish programs where animal by-products not suitable for human consumption can be used appropriately for other purposes that are safe to the environment.

7. Establish programs, where biological and pharmaceutical products related to animals are safe to both humans and animals.

8. Establish programs to control diseases and prevent their transmission to humans and animals.

9. Generate income-generating enterprises for the rural population from small ruminant production.

Activities

a. Management-Related Activities

The Jordanian government at the appropriate level, with the support of the relevant international and regional organizations should:

1. **Draw up breed preservation plans (semen/embryo collection and storage, farm-based**

Plan and initiate breed development strategies

conservation of indigenous stock or in situ preservation).

2. **Plan and initiate breed development strategies.**

3. **Select indigenous populations on the basis of national as well as regional importance and genetic uniqueness.**

4. **Plan and initiate programs to control animal diseases nationally and regionally.**

5. **Initiate and develop graduate and undergraduate programs related to breed preservation and animal health.**

6. **Training and extension programs that emphasize herd management with regards to selection and breeding of good quality animals and understanding range management that ensures sustainability.**

7. **Feed and nutrition programs to optimize and improve feed ratios especially those based on local agricultural residues including olive residues, residues of tomatoes paste and manufacturing crop residues. Programs on supplementary nutrition such as minerals and trace elements are also deemed necessary. Integration of animal productions with plant production should be encouraged and investigated especially in rainfed areas.**

8. **Establish artificial insemination programs to improve the productivity and disease resistance of the local animals and to determine the proper period of pregnancy and birth when local feeds are abundant.**

9. **Carry out research and establish well equipped laboratories.**

10. **Establish training programs in the field of embryo transfer at different levels.**

11. **Strengthen linkages with international and regional organizations to forge joint activities with regards to:**

Gene exchange and regional gene banks

Exchange of information and establishing access to global databases.

Access to scientific and inter-governmental programs and evaluation of regional and national activities.

Preparation and publishing of a list of agriculture animals at risk justifying government intervention to conserve them and / or to seek technical assistance, where necessary.

b. Data and Information

The Jordanian government at the appropriate level, with the support of the relevant international and regional organizations should:

1. **Prepare and complete inventories of available animal genetic resources.**

2. **Complete surveys of animal diseases and their threat to humans and animals.**

3. **Train nationals in diagnosis and control of animal diseases.**

4. **Implement public awareness and training programs including lectures and workshops, training**

in breeding, vaccination, and protection from disease, nutrition, record keeping and others related areas.

c. International and Regional Cooperation

The appropriate United Nations organizations, World Health Organization and other international and regional agencies should help Jordan:

1. To promote the establishment of national / regional gene banks to the extent that they are justified based, on principles of technical cooperation among developing countries.

2. To process, store and analyze animal genetic data at the national / regional / global level which can be shared and watched with an early warning system for endangered breeds.

3. To prepare and publish a comprehensive database of animal genetic resources, describing each breed, in terms of its derivation, its relationship with other breeds, effective population size and concise biological and population characteristics.

4. To prepare and publish a national watch list on farm animal species at risk to enable national governments to take action to preserve endangered breeds and to seek technical assistance where necessary.

5. To promote the establishment of central reference diagnostic laboratory for animal disease.

6. To prepare and publish a national list of farm animal diseases to enable national and regional cooperation for controlling animal diseases.

7. Promote the establishment of centers or laboratories to ensure quality control on pharmaceutical companies, dairy factories, animal feed factories, slaughterhouses, and appropriate importation and exportation of animals and their products, with no or little effect on the environment.

8. Promote programs for animal welfare.

The Jordan Country Study on Biological Diversity funded by UNEP/GEF and managed by

commitment to conserve its natural resources and biological diversity and to ensure the sustainable use of its resources. To give the study its specific dimension and appropriate depth, the Government of Jordan drew upon its human resources in the public, private and academic sectors. The cumulative effort of 54 Jordanian experts in the various fields of conservation and management of resources is culminated in this solid work derived from their experience and knowledge.

This effort that Jordan is placing in the hands of the international community examines the present status and level of the existing species and their distribution, reports on the wealth of genetic resources, investigates the economic

3.2 CULTURAL HERITAGE

I. INTRODUCTION

The protection of the environment is an essential part of sustainable development. This obvious statement needs to be translated into practical guidelines, especially in the developing countries where economic and political pressures may force decision-makers to take measures without regard for their adverse impacts on the environment.

This section will discuss cultural heritage, considered as an important part of the human environment that faces many of the problems affecting the natural environment. Like the deterioration of the environment, destruction of cultural heritage and resources is a global problem needing the combined efforts of the international community. Threats to cultural heritage come from several sources, including illicit trade in antiquities, haphazard development and growth and general public apathy. The result is the irretrievable loss of cultural resources.

Cultural heritage is considered as an important part of the human environment

The most obvious contribution of cultural resources to the local economy is in the tourism sector. In 1996, the tourism sector contributed more than JD 604 million or around 11% of the GDP of Jordan. The total amount of foreign exchange brought in by foreign tourists in 1994 has been estimated at around US$ 663 million. This constitutes more than 50% of the total amount of merchandise exported in 1994. As a three foreign exchange earner, after working remittances and commodity exports. Currently, the emphasis in tourism is on antiquities. This is creating pressure on the monumental archaeological sites, particularly the city of Petra. The most effective way of decreasing this pressure while still maintaining the projected economic growth in the tourism sector is through the diversification of tourist attractions.

The most obvious contribution of cultural resources to the local economy is in the tourism sector

Some 93% of tourists questioned in a recent survey said they come to Jordan because of its history and culture (SAPROF 1997: 4). This, together with the social make-up of Jordanian society, suggests it is probably futile to try to direct future expansion of the tourism sector away from cultural tourism. It is important to ensure the preservation of already protected archaeological sites, in part to ensure the continuation of economic benefits from the tourism sector.

II. PROGRAM AREAS

The following bases for action are common to the program areas under cultural heritage.

Basis for Action

The various national and regional bodies take fragmented decisions concerning cultural resources. There is a lack of integrated planning and coordinationin the absence of a nationally agreed upon management and land use planand of proper institutional mechanism for implementation of plans.

There is no clear decision-making mechanism for cultural heritage protection policy. This reflects the absence of a decision-making structure. The overlapping authorities of the main bodies involved further complicate this situation. The major governmental institutions involved are:

Ministry of Planning (MOP).

Ministry of Tourism and Antiquities (MOTA) in addition to the Department of Antiquities (DOA).

Ministry of Municipal and Rural Affairs and the Environment (MMRAE).

Ministry of Culture (MOC).

Ministry of Waqf and Religious Affairs (MOWRA).

Regional and local authorities and other involved institutions, including:

Aqaba Regional Authority (ARA).

Petra Region Planning Council (PRC).

Jordan Valley Authority (JVA).

Royal Society for the Conservation of Nature (RSCN).

There is an urgent need to review and analyze the legislation establishing the role and authority of the Department of Antiquities and other government entities involved in cultural resources preservation, and to review the mandate of regional authorities with respect to cultural resources. This analysis should address the functional authorities of the various agencies, identifying and proposing ways to resolve possible contradictions or inconsistencies among the authorities granted to different agencies and conflicting mandates between the legislative authorities and organizational functions of the agencies.

Promote Jordan as a safe tourism destination by the year 2000

No clear strategy has yet been adopted to build capacities of the government institutions or technical personnel concerned with cultural resources. Major constraints financial and administrative constraints, lack of expertise, etc. - are limiting the development of these necessary institutions and technical capabilities. There is a great deficiency in technical expertise related to the conservation of cultural resources.

The formal institutions that have been recently involved in the protection of the architectural heritage related to the MMRAE/ the existing Heritage Section need to be evaluated and enhanced. A proper setup including the goals and objectives of this new department need to be planned if such a section is to assume responsibil
need to be enhanced and revised in order to present a skeleton that could allow for comprehensive development projects related to the protection of the natural and cultural component and resources of the country.

Integrate the cultural component in all implemented tourism projects

The tourism development strategy adopted by the government in

to take into account both the establishment and enhancement of the proper umbrella for the development and protection of the archaeological and cultural sites. for the tourism industry. This development also needs to be supported by proper legislation; present laws are not adequate.

The roles of local governments, municipalities and local councils need to be clearly defined. A new strategy of investing in the tourism industry as a main tool of development needs to be developed. Proper training and capacity building of related bodies will be essential to enhance local decision making capacities and to ensure satisfaction of the needs and aspirations of local communities, local governments and the central government.

A. ARCHAEOLOGY AND TOURISM

Objectives

1. Safeguard cultural and natural resources to ensure sustainable development that maintains both economic growth and the fullness of cultural and natural diversity. for present and future generations of visitors whether local or foreign.
2. Develop the tourism sector as a key tool for social and economic development.

Activities

1. Implement projects contained in various development plans for the tourism sector.

2. Integrate the cultural component in all implemented tourism projects, to ensure the achievement of sustainable development

B. NATIONAL STRATEGY FOR ARCHAEOLOGICAL INVESTIGATIONS

Objectives

Integrate social and economic aspects with the physical rehabilitation of tourist sites and projects in local communities

1. Change the popular perception of archaeology as excavations and archaeologist as excavator.
2. Integrate excavations as part of a comprehensive national strategy of archaeological heritage management.
3. Protect the archeological heritage in the landscape and only as the last resort, after excavation, in museums.

Activities

- **Carry out systematic and comprehensive field surveys and recording of archaeological sites in the landscape; prepare archaeological heritage data bases that will allow for the integration of this heritage with the overall developmental policies in the country; preservation; and presentation.**
- **Create a national register of archeological and cultural resources.**
- **archeological data base information system**
- **Preserve and restore projects.**

C. LOCAL COMMUNITIES PARTICIPATION AND PUBLIC AWARENESS

Adopt a more relevant definition of antiquities

Objectives

1. Enhance public awareness

cultural heritage.
2. Enhance the role of local communities in general, including local authorities and the private sector, in the preservation of cultural heritage.
3. Ensure the sustainability of archeological conservation management

Activities

1. Integrate social and economic aspects with the physical rehabilitation of tourist sites and projects in local communities.
2. Integrate archeology and traditional architecture in Jordan into teacher training colleges and public and private schools as a regular part of required curriculum.
3. Provide support, morally and financially, to nongovernmental societies that undertake awareness and education activities for the public and monitor the archeological and traditional architecture heritage preservation.

D. LEGISLATION

Objectives

- Revise and update the law of antiquities of Jordan (Provisional Law No. 21 for the year 1988) to include the new aspects that are included in the draft of a unified antiquities law for all Arab countries that was submitted by ALECSO and discussed at Sharja in Feb 1998.

- Adopt a more relevant definition of antiquities that will allow for the protection of much cultural heritage, which are currently not provided for in the Jordanian legislation.

- Enforce and provide incentives for the implementation of the Law of Antiquities of Jordan and related regulations.

- Decentralize activities of cultural heritage conservation to involve local communities, municipalities and the private sector.

Activities

1. Involve the DOA, other concerned departments, and civil society organizations in the process of updating the legislation pertinent to Antiquities in Jordan.
2. In the new law, local governments, including municipalities, need to play a more effective role and should be encouraged to undertake projects to protect their local architectural and cultural heritage.
3. Reconsider land use and ownership regulations in order to enable the DOA to ensure better management of archeological conservation.
4. Undertake capacity building and institutional strengthening activities to enable the DOA to cope with the rapid technological changes in the fields of communication and dissemination of information.

Municipalities need to play a more effective role to protect their local architectural and cultural heritage

Chapter Four

Legislative and Institutional Aspects for Sustainable Development

Jordan has agreed to many international conventions related to sustainable development

1. INTRODUCTION

This chapter discusses legal, regulatory and institutional issues related to sustainable development in Jordan and describes major initiatives that need to be undertaken

move towards sustainable development.

Clear and effective laws and regulations are needed to support

development strategies and policies. Enforcement of these laws and regulations will be crucial for transforming sustainable development strategies and policies into action.

Jordan has already agreed to many international conventions related to sustainable development and will continue to be actively involved with international legislation related to the environment and development. Jordan needs to develop its own legislation and enforcement procedures related to sustainable development more rapidly.

A wide range of issues needs to be

regulations in support of sustainable development. Jordan has developed some notable legal instruments in support of sustainable development in recent years, such as the law for Environmental Protection No. 12 (1995). Yet a number of important constraints and barriers remain to be overcome.

The requirements and principles of sustainable development have been given little or no consideration in most of the laws and regulations

The programme areas discussed in this chapter are:

A. Formulation of Laws and Regulations in support of Sustainable Development.
B. Enforcement of Laws and Regulations in support of Sustainable Development.
C. Strengthening and Activating Environmental Laws and Regulations.
D. Strengthening and Empowering the General Corporation for Environmental Protection.(GCEP)

II. PROGRAM AREAS

A. FORMULATION OF LAWS AND REGULATIONS IN SUPPORT OF SUSTAINABLE DEVELOPMENT

Basis for Action

Over the last decade, Jordan has aimed to integrate its legislation on environment and development in order to better promote sustainable development. Yet socio-economic development plans still tend to be formulated paying only lip-service to sustainability issues and the need for integrated approaches to development. For example, Jordan has formulated a number of economic laws and regulations in recent years, promoting investment and economic development and responding to the

circumstances. The requirements and principles of sustainable development have been given little or no consideration in most of these laws and regulations.

Science and technology have important roles to play in support of sustainable development. These roles of science and technology need to be promoted actively with appropriate legal (and economic) instruments.

To date Jordan has established one principal environmental law. Law No-12/1995. This law now needs to be applied through the development of the necessary by-laws, directives, and other legislative and regulatory

law also needs to be effectively reconciled with other national laws that deal with environmental issues in various ways. Possible duplications of authority and responsibilities and other potential sources of discord need to be clearly identified and resolved.

The institutional framework for environmental protection in Jordan also needs attention. Administrative and management structures and

systems, and staff working conditions all need improvement if Jordan is to have effective environmental protection.

regulations related to sustainable development needs to reflect, in a more comprehensive way, the principle of integrating environmental protection with socio-economic development. This will require improving and adjusting existing legislation which already aims to promote sustainable development and introducing new legislation focused on increasing the sustainability of Jordanian economic and social development policies and programmes. Further strengthening of local legislation is also essential for ensuring principles of sustainable development that can be effectively integrated into local development strategies, policies and programmes.

Incorporate the principles and concepts of sustainable development into laws and regulations relating to economic development

Finally, there is a need to ensure that Jordan is in accord with international practices in developing legislation, technical regulations and standards related to sustainable development.

Objectives

1. Incorporate the principles and concepts of sustainable development into laws and regulations relating to economic development.

2. Improve existing legislation related to sustainable development.

3. Promote sustainable development through laws and regulations related to industry.

4. Reinforce existing environmental laws and regulations.

5. Enhance the roles of public and social organizations, as defined in national legislation, in support of sustainable development.

Cooperate with international organizations to improve national capacity to formulate laws and regulations in support of sustainable development

6. Strengthen research and education related to regulations and laws in support of sustainable development.

7. Expand regional and international co-operation and communications related to laws and regulations in support of sustainable development.

Activities

1. **Develop a national programme to promote laws and regulations in support of sustainable development.**

2. **Establish an information system for collecting data and documentation related to laws and regulations in support of sustainable development.**

3. **Co-operate with international organizations in training personnel involved in formulating and enforcing laws and regulations in support of sustainable development.**

4. **Cooperate with international organizations to improve national capacity to formulate laws and regulations in support of sustainable development.**

5. **Establish data and information bases and training facilities related to laws and regulations in support of sustainable development.**

6. **Review and analyze existing laws and regulations in support of sustainable development at the national level.**

7. **Ensure effective co-ordination in the implementation of existing laws and regulations in support of sustainable development at the national level.**

8. **Examine existing laws and regulations related to the environment, resources and industry to determine their conformity with the national Agenda 21 and the principles of sustainable development.**

9. **Design programmes to formulate, revise and improve national and local plans, programs and activities related to laws and regulations in support of sustainable development.**

10. **Enact laws aimed at improving educational levels and physical well-being of Jordanian citizens.**

11. **Ask government agencies to consider potential sustainable development impacts when formulating policies and plans and approving projects.**

12. **Require government institutions to regard sustainable development as one of their guiding principles when formulating social and economic development plans.**

13. **Enact laws promoting cleaner production and clean energy sources.**

14. **Incorporate the principles of sustainable development when formulating such key economic laws as the company law.**

15. **Formulate and enforce laws and regulations on the prevention and control of desertification.**

16. **Formulate and enforce laws and regulations on the prevention and control of pollution by solid wastes .**

17. **Formulate and enforce laws and regulations on the exploitation of natural resources, and on the protection and management of nature reserves.**

18. **Revise and improve existing natural resource management laws and regulations, to ensure that they effectively reflect sustainable development principles.**

19. **Ensure that legislation exists allowing for the enforcement of international conventions to which Jordan has acceded - such as the global convention on the control of substances depleting atmospheric ozone - so that Jordan can fulfil national obligations in the area of global sustainable development.**

20. **Develop and improve a consultative process for developing laws and regulations in support of sustainable development.**

21. **Establish and improve a system for public feedback about laws and regulations in support of sustainable development.**

22. **Analyze, study and act on problems arising in the implementation of laws and regulations in support of sustainable development.**

23. **Study important legal issues concerning the environment and development.**

24. **Provide government institutions with recommendations about concrete requirements for laws and regulations in support of sustainable development.**

25. **Employ experts to compile teaching materials on laws and regulations in support of sustainable development.**

26. **Teach Jordanians about laws and regulations in support of sustainable development using mechanisms such as public school education, mass media and workshops.**

Strengthen public education in support of sustainable development

Establish and improve a system for public feedback

The country is now confronted with a number of challenges related to enforcement of laws

B. ENFORCEMENT OF LAWS AND REGULATIONS IN SUPPORT OF SUSTAINABLE DEVELOPMENT

Basis for Action

The actual value of any law or regulations in support of sustainable development will depend on its actual enforcement. Therefore, the development of laws and regulations in support of sustainable development and their subsequent enforcement should be accorded equal importance.

Jordan has enacted laws and regulations in support of sustainable development in various specific areas, including the law for environmental protection (No 12/1995). The country is now confronted with a number of challenges related to their enforcement. Issues, such as lack of enforcement of these laws and regulations and unpunished violations, need to be gradually addressed.

Jordan needs to improve its systems for enforcing laws and regulations in support of sustainable development. The country needs to examine how its measures for enforcing these laws and regulations are actually working in practice, and to gradually improve these laws and regulations, based on reliable feedback regarding their enforcement.

Strengthen the role of the National Council (Parliament) in supervising the implementation of laws and regulations in support of sustainable development

Objectives

1. Establish and perfect the system for enforcing laws and regulations in support of sustainable development.

2. Strengthen public education in support of sustainable development.

3. Enhance the capacity to enforce national laws and regulations in support of sustainable development.

4. Strengthen the system for supervising the enforcement of laws and regulations in support of sustainable development.

5. Enhance the linking of judicial with administrative procedures in support of sustainable development.

6. Expand the role of public and mass organizations in the enforcement of laws and regulations in support of sustainable development.

Activities

1. **Study various alternative systems of enforcement of laws and regulations in support of sustainable development.**

2. **Develop a system for effective**

regulations in support of sustainable development.

3. **Incorporate public education into laws and regulations in support of sustainable development, into the national plan .**

4. **Organize large-scale public education and training on newly promulgated laws and regulations in support of sustainable development.**

5. **Incorporate information about of sustainable development into the basic school curriculum.**

6. **Give wide coverage to important cases in the enforcement of laws and regulations in support of sustainable development.**

7. **Establish and build the capacities of executing agencies at the local level.**

8. **Improve conditions for enforcing laws and regulations in support of sustainable development.**

9. **Train the necessary law enforcement and judicial personnel needed to enforce laws and regulations in support of sustainable development.**

10. **Increase the number of trained personnel responsible for implementing sustainable development laws and regulations .**

11. **Ensure that administrative procedures of government agencies include mechanisms for the enforcement of laws and regulations in support of sustainable development.**

12. **Ensure that administrative behavior within government agencies is congruent with the principles of sustainable development.**

13. **Ensure that Jordanian enterprises adopt effective measures to ensure their respect of sustainable development principles.**

14. **Include mechanism for enforcement in judicial procedures.**

15. **Improve the system for making and investigating complaints regarding violations of laws and regulations in support of sustainable development.**

16. **Ensure those legally recognized groups and organizations have reliable channels for participation in public dialogue and debate on sustainable development issues.**

17. **Strengthen the role played by lawyers in support of sustainable development in Jordan.**

Train the necessary law enforcement and judicial personnel

18. **Promote the training and building of teams of professional lawyers, capable of providing services in support of sustainable development.**

19. **Conduct periodic reviews of the ways the laws and regulations in support of sustainable development are being implemented.**

20. **Standardize and harmonize the conditions for enforcement of laws and regulations in support of sustainable development.**

21. **Improve the procedures followed for supervising the implementation of laws and regulations in support of sustainable development.**

22. **Strengthen the role of the National Council (Parliament) in supervising the implementation of laws and regulations in support of sustainable development.**

23. **Develop a system for examining how administrative and judicial bodies enforce laws and regulations in support of sustainable development.**

C. STRENGTHENING AND ACTIVATING ENVIRONMENTAL LEGISLATION

Basis for Action

Jordan had established a National Environmental Strategy and participated in

National Environmental Action Plan (NEAP) was formulated in 1996.

- the Law for Environmental Protection was enacted in 1995. The General Corporation for Environmental Protection (GCEP) is the body responsible for overseeing the implementation of this law. For a number of reasons, however, the enactment of this environmental law, and the establishment of GCEP have had little effect on environment

administrative and technical capabilities, for example, lag far behind the requirements of its mandate.

The law for environmental protection suffers from certain defects, related to the fines prescribed for violations and prosecutions for repeated violations

The law for environmental protection also suffers from certain defects, related to the fines prescribed for violations and prosecutions for repeated violations, for example, and to its lack of reference to regional and international agreements.

The mechanisms for activating the law are vague and weak and there is no clear systematic legal mechanism for its enforcement. The actual activation of the law has been very slow due to a number of factors, including the slow process of enacting the by-laws and regulations necessary to enforce it.

Several other laws brought in by other government agencies, prior to the Environment Protection Law, overlap the jurisdiction of this law.

Objectives

1. To activate and enforce the law on Environmental Protection, Law No. 12 of 1995.

2. To strengthen and promote co-ordination and complementarity between the Environmental Protection Law and other Jordanian laws and regulations.

Activities

1. **Formulate by-law(s) for regulations related to water resources, water supply and water protection (Article 17 of the law No 12 / 1995).**

2. **Formulate by-law and other associated regulations on air quality monitoring and pollution control, (Article 18 of the said law).**

3. **Formulate by-law and associated guidelines on soil protection, (Article 19 of law No.12).**

4. **Formulate by-law(s), guidelines and regulations on natural reserves, biodiversity (Article 21).**

5. **Formulate guidelines and regulations for enforcement of the law (Article 22) .**

6. **Coordinate monitoring and control activities with Aqaba Regional Authority, the Jordan Valley Authority**

The mechanisms for activating

and other entities for enforcement of law No 12/1995 (Article No. 23).

7. **Establish guidelines and regulations on the use of agricultural pesticides and on the control of their residues in the environment (water, soil, food and other agricultural products) (Article No 26).**

8. **Establish by-law(s) and guidelines on solid waste, particularly hazardous wastes, such as medical wastes (Article No 20).**

9. **Establish by-law(s) and related guidelines and regulations on the discharge of wastes, of any type, into the environment (Article No 26).**

10. **Establish a mechanism for regular, systematic review and update of legal issues related to the environment and sustainable development. (see B19)**

11. **Establish a co-ordination mechanism for dealing with legal issues related to disputes which may arise when the duties and activities of concerned authorities are in conflict with the Environmental Protection Law.**

12. **Establish a systematic process for reviewing data and feedback collected relative to legislation developed to promote environmentally sustainable development in Jordan.**

Establish by-laws and guidelines

13. **Encourage and support co-operation among and within the other national entities engaged in developing the necessary legal instruments for promoting sound environmental management in Jordan.**

14. **Promote and develop co-operation on environmental law, with other Arab countries and with international organizations and centers.**

D. STRENGTHENING AND EMPOWERING GCEP TO FULFILL ITS MANDATE UNDER LAW NO 12 OF 1995

Objectives

1. To improve and upgrade the management system at GCEP.

Improve and upgrade

management systems

2. To improve and upgrade data processing within GCEP and information exchange both within GCEP and between GCEP and its partner organizations in Jordan.

Activities

1. **Define national environmental goals and indicators.**

2. **Review and analyze all current activities at GCEP including all existing services and systems.**

3. **Improve existing approaches and methodologies within the GCEP and introduce appropriate new approaches and methodologies where necessary.**

4. **Develop and implement an action plan for GCEP.**

5. **Conduct an assessment of what GCEP needs in order to implement the Environmental Protection Law.**

6. **Develop clear job descriptions and task analysis corresponding to the specific activities and duties that have been assigned to the GCEP .**

7. **Use an internal participatory process to define needs of the GCEP for human resources development.**

8. **Develop and carry out suitable training activities for GCEP personnel.**

9. **management systems including systems for general administration, financial and human resource management and other support services.**

10. **Incorporate a comprehensive programmes.**

11. **Promote and ensure effective inter-departmental meetings and other ways of improving internal co-ordination within GCEP.**

12. **Use existing data and information systems to identify how GCEP can support the needs of the affected populations at risk, and to identify those areas where this needs to be treated as a high priority.**

13. **Working in co-operation with stakeholders, ensure effective compliance monitoring, inspections, and enforcement of environmental management norms where necessary.**

14. **Promote more effective communications and partnerships among the GCEP, specific stakeholder groups and the general public.**

15. **Ensure that stakeholder groups and the general public have sufficient access to environmental information and education.**

16. **Strengthen partnerships between the GCEP and different national and local entities .**

17. **Review existing environmental legislation on a periodic basis, updating this where necessary as a result of progress or other developments in the**

legislation.

18. **Ensure that environmental data**

policy makers, scientists and public.

Guide the processes of formulating local sustainable development agendas

19. **Measure progress of specific environmental management activities and improve the quality and effectiveness of environmental reporting and information dissemination.**

20. **Guide the processes of formulating local sustainable development agendas, and provide support for public participation in these processes.**

21. **Improve communications and data sharing within the GCEP and between the GCEP and other governmental departments.**

Chapter Five

Education & Awareness

There is a lack of understanding the role of education in supporting sustainable development

Develop environment and sustainable development education and training

requirements for formal education, human resource development and awareness building in support of sustainable development. The

National Strategy for Environmental Education, Awareness and Communications, attached as an Annex. This strategy has been prepared by many of the same Jordanian experts who collaborated to develop this chapter.

5.1 PROMOTING FORMAL EDUCATION IN ENVIRONMENT AND SUSTAINABLE DEVELOPMENT

A. INTRODUCTION

Moving Jordan towards more sustainable development will depend, among other things, on our efficient and consistent use of the most advanced scientific and technological knowledge in many disciplines. The explosion of information, new knowledge and new technology strains current curricula for environment and sustainable development education. It is very important that future development programmes aggressively develop environment and sustainable development education and training to educate both the current and future generations, enabling them to meet the challenges of sustainable development in coming decades.

B. PROGRAM AREAS

1st. ENVIRONMENT AND SUSTAINABLE DEVELOPMENT EDUCATION AT UNIVERSITIES

Basis for Action

Universities have a leading role to play in the development of sustainable development education.

involved in shaping, directing, and facilitating education and research activities related to the development of both preventive and remedial solutions to multifaceted environment and sustainable development problems. Regardless of their respective disciplines, all university students need to acquire an awareness of the problems, laws and regulations, ethics and responsibilities, associated with

sustainable development challenges.

There is a lack of understanding of the role of education in supporting sustainable development. Consequently, there is no clear definition of the educational requirements for sustainable development. Environmental education is not mentioned in the new law for environmental protection, for example, nor is there any requirement for including environment and sustainable development issues in Jordanian educational curricula.

There is a general lack of coordination among the different universities with regard to environment and sustainable development education. There is sometimes even a lack of coordination and communications among different colleges of the same university. There is also inadequate coordination among the establishments responsible for environmental education at the pre-college level. There is a need to develop and harmonize the procedures and criteria used to evaluate the effectiveness of environment and sustainable development education.

There is a general absence of authorities or bodies able to provide the Jordanian public and/or specialists with specialized technical

information about different sustainable development issues and options of interest for Jordan. There is also a shortage of adequately trained personnel in the areas related to sustainable development. Inadequately trained personnel with insufficient knowledge and skills are carrying out tasks which should be done by people with greater expertise. Most Jordanian specialists lack, for example, the experience and training needed to work effectively in multi-disciplinary teams. Such teams also lack the common vocabulary and shared definitions needed to work together on solutions to sustainable development problems. Finally, the training at educational institutions is not well adapted to the needs of local industries.

Non-formal environmental education (NFEE) can provide a valuable tool for reversing environmental degradation

There is no substantial environment and sustainable development research being carried on by Jordanian institutions and there are no doctoral programs in related areas. There are insufficient partnerships between our universities and international environmental and sustainable development establishments. These partnerships are needed to facilitate the transfer of up-to-date knowledge and expertise.

There is a lack of environment and sustainable development awareness programs aimed at building the awareness of the Jordanian public.

Establish a network for environment and sustainable development education

Objectives

One. Enhance environment and sustainable development education at the university level
Two. Train professionals working in this area.
Three. Coordinate activities on environment education
Four. Encourage research and partnership in sustainable development.

Activities

1. Strengthen the capacity of Jordanian universities to define requirements for sustainable development education and to offer the relevant programs.

2. Establish a network for environment and sustainable development education among educational and training institutions in all parts of Jordan.

3. Develop environment and sustainable development education curricula that: 1) take into consideration the fast pace at which environment and sustainable development issues are evolving and 2) emphasize the acquisition of learning processes as well as knowledge.

4. Develop a common sustainable development vocabulary which can be shared by all disciplines in Jordan.

5. Build the capacities of university personnel to meet the challenges of sustainable development education.

6. Establish distance learning programs in support of sustainable development.

7. Develop and apply criteria for evaluating the success of environment and sustainable development education programmes.

8. Promote the abilities of Jordanian scientists and university staff to identify, manage and incorporate environment and sustainable development consideration into research and development projects in their respective disciplines.

2nd. NON-FORMAL ENVIRONMENTAL EDUCATION PROGRAM

Basis for action

A broad transition towards more environmentally sound practices is needed in order to attain environmental sustainability. This transition towards sustainability will require the full participation of all members of the Jordanian society. Practical solutions and alternatives will need to be promoted and introduced in many sectors. Feasible remedial and preventive strategies will be needed to avoid further environmental damage.

Re-orienting education towards sustainable development

Non-formal environmental education (NFEE) can provide a valuable tool for reversing environmental degradation. The process of NFEE provides people with functional environmental knowledge, awareness, and skills. Research has documented the positive impacts of various international, national, local, and individual experiences in NFEE. These impacts include fundamental attitudinal shifts and commitments to cleaner and more efficient ways of doing things, as well as a reorientation of consumption and production patterns. NFEE focuses on people from all walks of life (adults, youth, and children, men and women, professionals and ordinary people, etc), and can be introduced by the school system, as well as by non-governmental organizations (NGOs), institutions, businesses, foundations and the private sector.

Build the human resources, skills, and educational resources

In the past decade governments in UN General Assemblies, Governing Councils, and regional political bodies, calling for re-orienting education towards sustainable development have adopted significant resolutions and mandates. They also call for the engagement of all sectors of society - particularly women and youth- in environmental management through changing attitudes and increasing knowledge, awareness, and skills. The important role of education and public awareness for achieving sustainable development has been reaffirmed, broadened and deepened within the new international consensus and framework of action emerging from the series of international conferences organized by the UN in Cairo (population), Copenhagen (Social development), Beijing (Women), and Istanbul (Human Settlements).

According to this international consensus, Non-Formal Environmental Education (NFEE) provides women, youth and children groups with information, skills, know how and technologies that help in combating serious environmental problems such as desertification, deforestation, depletion of plant genetic resources, proliferation of hazardous chemicals and mismanagement of water resources in the home, agriculture, commerce and industry.

NFEE deals with the dynamics of both the physical /biological and socio-economic environment and human (which may include spiritual) development. NFEE efforts need to address the most urgent environment and sustainable development challenges facing Jordan related to water resources, land resources, other natural resources, the urban environment and cultural resources. They should be aimed at the most receptive segments of the community, who will be most likely

to accept and promote the concept of sustainable development.

Objectives

1. Integrate and co-ordinate the NFEE efforts of different educational authorities in Jordan.
2. Build the human resources, skills, and educational resources available for NFEE.
3. Improve the evaluative and analytical research efforts in the field of NFEE.
4. Involve people from the grass roots, especially women, in planning, designing and evaluating NFEE programs.

Ministry of Education should take a leading role

C. PUBLIC SECTOR ENVIRONM-ENTAL EDUCATION PROGRAM

Basis for Action

It is appropriate that the Ministry of Education should take a leading role in the development of the training activities related to the environment and sustainable development, and in the development of preventive and multifaceted sustainable development problems. Regardless of their levels, all students in the Basic and Secondary stages should acquire an awareness of environmental problems, environmental laws and regulations, and related ethics and responsibilities. Professionals concerned with curricula and textbooks in Jordan apparently agree that environmental education is a key requirement for meeting the challenges of sustainable development in the future.

Environment and sustainable development training efforts need to address the most urgent environment and sustainable development challenges facing Jordan related to water resources, land resources, other natural resources, the urban environment and cultural resources.

Jordan suffers from lack of:

knowledge and information about the importance of protecting natural resources and about their relevance to humans and animals.

awareness and understanding of local and regional environmental problems such as pollution and resource degradation, and of the need to find solutions for them.

knowledge and awareness related to the need to protect local environments around schools and houses for example and how to keep them healthy, clean and beautiful.

knowledge and information related to integrated pest management techniques which can help control insects which transmit diseases, in ways which are less damaging to the environment.

knowledge and information about the role of maintaining living standards and about the importance of the regional and international co-operation to exchanging the practical experiences and proven technologies needed to a more sustainable manner .

knowledge and information related to population problems and their relationship with environmental degradation.

environmental information and concepts available to be presented to Basic Stage pupils. All materials developed need to fit the abilities and development stage of Basic Stage pupils.

Involve people from the grass roots, especially women, in planning, designing and evaluating NFEE programs

There is also a need to develop the positive attitudes towards and behavior related to:

1. changes in consumption patterns and towards participation in local and regional environmental projects.
2. local, regional and global environments.

There are needs to:

1. Promote attitudes, habits and behavior in support of healthy lifestyles.
2. Improve environmental research techniques through greater scientific rigor and more critical thinking.
3. Promote greater participation in decision-making processes.
4. Training is a key tool for developing and improving human resources and supporting the transition to a more sustainable society.

Objectives

1. Promote environmentally sound education, knowledge information, awareness and positive attitudes.
2. Promote environment and sustainable development training efforts to address the most urgent environment areas.

Carry out a comprehensive survey of the treatment of environmental and sustainable development concepts in existing curricula

Activities

1. Carry out a comprehensive survey of the treatment of environmental and sustainable development concepts in existing curriculum documents and textbooks.

2. Prepare a collection of environmental

included in Jordanian curricula and textbooks. Incorporate those concepts not currently found in these curricula and textbooks.

3.
teaching techniques for environmental and sustainable development terms and concepts.

4.
includes a glossary of environmental and sustainable development terms and concepts at the end.

5. Train supervisors who can then train teachers in the various Educational Directorates to teach the environment and sustainable development concepts. All the subject specialists, including textbook writers and educational supervisors should be trained thoroughly in the field of environmental education and on how to deliver it. Teachers, supervisors and subject specialists should have their capacities upgraded to allow them to provide students with the knowledge, information, skills and positive attitudes needed for more environmentally sustainable behavior.

6. Encourage schools to establish clubs for protecting and serving the environment and promoting sustainable development.

7. Prepare documentary films on the local and regional environment, which cover the various environment and sustainable development concepts.

8. Support exchange of experiences between Jordan and other Arab countries in the field of teaching and applying the environment and sustainable development concepts in schools.

9. Develop environment and sustainable development education curricula that: 1) take into

consideration the fast pace at which environment and sustainable development issues are evolving and 2) emphasize the acquisition of learning process as well as knowledge.

10. Develop a common sustainable development vocabulary that can be shared by all disciplines in Jordan.

11. Establish distance learning programs in support of sustainable development.

5.2 PROMOTING INTEGRATION OF SUSTAINABLE DEVELOPMENT ISSUES INTO HUMAN RESOURCE DEVELOPMENT

A. INTRODUCTION

Jordan has a well-established infrastructure for training government, private sector and NGO staff. Training institutions, both private and public have increased in quantity and quality in recent years. The Government of Jordan recognizes the importance of building its human resources and allocates 3-5 % of its annual budgets for this purpose. Eighty development administrative units have recently been established within public organizations.

Jordan possesses considerable individual and institutional training capacity

Jordan possesses considerable individual and institutional training capacity. However, these potentials need to be sharpened and strengthened. The King Hussein Environmental Training and Management Program (KHEMPTP) offers a model. KHEMPTP works to build the institutional and human capacities needed to build expertise. The project addresses the need for human resources development in EIA, environmental audit, environmental law and public awareness. Similar projects could be adopted to develop human resources.

Develop IT training programs

Other potential institutions to deliver training modules are the Vocational Training Centers that could focus on integrating ecological consideration at the management level. Jordan is rich in various kinds of training centers and the projects of each could be upgraded to integrate the concepts of sustainable development in their curricula and training activities.

B. PROGRAM AREA

1st. TRAINING PROGRAMS

Basis for Action:

Problems facing environment and sustainable development training activities in Jordan can be summarized as follows:

Environment and sustainable development issues are still ignored in most training programs; they still need to be integrated into many sectoral training programs.

There is a lack of coordination among training institutions and programs.

Environment and sustainable development training programmes suffer from financial difficulties, lack of independence and constraints imposed by bureaucratic laws and regulations and institutional weaknesses.

There is a lack of systematic monitoring and follow up on training programmes.

NGOs are a focal point for a large number of women all over Jordan; NGOs - if provided with technical skills - could play a major role in planning and implementing environment and sustainable development training programmes.

Conduct training programs to enhance capacities for institutional development and decentralization

Information media have the power to influence public opinion

Objectives:

1. Build national capacities and capabilities for sustainable development.
2. Use training to enhance the knowledge, skills and technical know-how needed to increase the number of participants in the decision making process.
3. Increase opportunities for work that involves integrating sound environmental management principles with socio-economic development.
4. Develop and improve the national labor force at all levels through development of technical know-how related to the environment and sustainable development.
5. Enhance community services related to public health and the environment.
6. Strengthen national capabilities in the areas of environmental data analysis and assessing the needs of special groups Develop local abilities to assess labor market demands for environmental skills and training.
7. Develop a national training resource book providing practical information on available training programmes, including up-to-date information on curricula, methodologies and evaluations of local, national, regional and international training programmes.
8. Enhance institutional capacities,

institutions.

Activities

1. Review and evaluate activities of the General Council for Environmental Protection (GCEP), then design a programme to build on their strengths, address their weaknesses and plan programs that will strengthen their institutional and individual capacities.

2. Select a team of individual trainers, stitutions and NGOs, to attend Training of Trainer

programs on sustainable development and environment.

3. Develop TT training programs concentrating on the following skills:

- **Preparing proposals for sustainable development and environment projects.**
- **Conducting needs assessment studies for natural resource management by special groups.**
- **Conducting training workshop in Impact Assessment for planned projects.**
- **Conducting training programs in project follow-up and evaluation.**
- **Integrating gender sensitivity into training programs.**
- **Conducting training workshops in fund raising techniques.**
- **Training in methods of conducting applied research.**

4. Develop tools - such as community or national consultation workshops - for improving coordination among concerned institutions.

5. Conduct training programs to enhance capacities for institutional development and decentralization.

6. Integrate environmental management skills in all sectoral and thematic training activities.

7. Conduct training programs to develop capacities for establishing national and regional networks that can connect businesses, training institutions and NGOs. These networks should help participants to exchange information about national, regional and international best

practice and related training materials.

8. Conduct special training programs for graduates of vocational training institutes to enhance their environmental management skills and to increase their opportunities for employment.

9. Prepare a national strategy for Contingency Plans related to environmental threats, with special emphasis on the types of training needed to be able to carry out these Contingency Plans when necessary.

10. In collaboration with the integrate themes related to sustainable developmental priorities, into the curricula of these institutes.

5.3 PROMOTING AWARENESS OF SUSTAINABLE DEVELOPMENT ISSUES

A. INTRODUCTION

The law alone cannot protect the common interest. This also requires the support of informed communities. Public media involvement is needed to communicate the necessary information to these communities. Protecting the common interest requires a high degree of public participation in decisions that affect the environment. This can be achieved by making communities aware of their environment and by giving them effective say over the use of the resources they depend on.

Individuals need to be persuaded to act in the common interest of all. It is

vict

better off if each person took account of the effects of his or her actions upon others. Well-enforced laws and strict liability legislation can help control harmful side effects, but even more important is the effective participation in decision making processes by local communities. This helps them articulate and effectively protect their common interests. Media can strongly support communities by sensitizing, educating and mobilizing the public with timely and reliable information. Information media have the power to influence public opinion and can often accomplish more than those who make laws or promulgate decisions.

The media have unique access to the public and special groups. This allows the media to make an equally

awareness and understanding of their environment and associated sustainable development issues. Environmental awareness in turn stimulates environmental action, activating voluntary behavioral and changing attitudes and values.

ability to think critically about the interrelation between people and their environment, heightens public sensitivity to environment and sustainable development problems and encourages participation. Enhancing awareness requires substantial efforts to make audiences aware of issues and to excite their interest in these issues. This awareness can be intellectual in nature (curiosity) or more a matter of feelings (emotions, conscience raising).

It is critically important to raise public awareness of environment and sustainable development challenges, and of the available technology and other instruments for addressing these challenges. Institutions, individuals, firms and others all need to be encouraged and helped to carefully evaluate their options and make informed decisions. As communities become more environmentally aware they are more likely to mobilize to keep their neighborhoods clean, or to demand that industries become more environmentally responsible.

B. PROGRAM AREA

A. NATIONAL ENVIRON-MENTAL AWARENESS AND COMMUNICATION PROGRAM

Basis for Action:

There is still a general lack of awareness in Jordan of the interrelated nature of human activities and the environment. There is a need to increase the sensitivity of individuals and certain groups, key environment and development problems. These individuals and groups need to be encouraged to be more involved in solving these problems. Their sense of personal responsibility needs to be fostered. They need greater motivation and commitment to the goal of sustainable development.

Promoting public awareness is an essential part of a broader national effort to strengthen positive attitudes, values and actions that are compatible with sustainable development. These are needed to overcome development challenges: threats to water resources; threats to land resources and land cover; threats to the urban environment; threats to cultural and national heritage. Enhanced environmental awareness is a key t resources can be managed in a sustainable manner, for the benefit of present and future generations, in

A review and analysis of the level of environmental awareness among the Jordanian public and among journalists revealed the following constraints:

Public involvement in awareness campaigns is limited

Technology and expertise campaigns is modest

Information available to the public and journalists is often inaccurate and insufficient

Training needed to support awareness campaigns is lacking

There is little sense of personal responsibility for environmental issues

Awareness activities suffer from lack of continuity and shortage of financial resources

Awareness activities sometimes also suffer from conflicts of interest

Policies and legislation that can foster environmental awareness are important tools

Public media involvement is necessary for effective awareness campaigns

Journalists need the following in order to carry awareness campaigns effectively:

Training on environment and sustainable development issues

Access to information on environment and sustainable development issues

The opportunity to participate fully in the sustainable development processes

Communication plans for various target groups and plans for working with other actors like government and NGOs

Personal commitment to continued efforts and activities in the environmental field

Objectives:

1. Promote awareness of environment and sustainable development issues, including issues related to nature conservation and environmental protection, among the Jordanian public and among members of the public media in particular.
2. Encourage community participation and involvement in natural resource conservation and environmental protection.
3. Build human and institutional capacities in the field of environmental resource management.

Coordinate public awareness programs to eliminate confusion and ensure wider understanding

One) Activities

1. Plan and carry out seminars, workshops and public hearings and produce publications addressing the following target groups: students, women, journalists, teachers, priests, leaders and farmers.

2. Plan and carry out a National Environment Awareness Program

population). Various environmental topics could be covered during the 21 years of school. Biodiversity in Jordan, in the region and in the world could be a topic for one age group, for example.

3. Plan and carry out a National Environment Awareness Program for university students. During their four years of university,

developed on key issues related to water, land, national heritage and solid waste.

4. Plan and carry out a National Environment Awareness Program for women. Women are a special group who are always in direct contact with the various natural resources. Work with women should put special emphasis on environmental issues that women encounter in their daily lives, related to water, energy, solid waste, chemicals, and home gardens.

5. Plan and carry out a training programmes that upgrade the information and knowledge available to special groups including teachers, priests, women and leaders. The aim is to establish a network of communicators who, by the nature of their jobs, are key resource people.

6. Plan and carry out a National Environmental Awareness Programme for farmers.

7. Plan and carry out a National Environmental Awareness Program for tourists and associated service providers such as tour guides, hotel and airline staff and so on .

8. Plan and carry out a National Environmental Awareness Program and Training program for journalists.
9. Use the following techniques in addressing the target groups described above:

Establish and disseminate a newsletter or a Web page.

Prepare printed materials (brochures, newsletter, posters, fact sheets)

Develop an information center

Prepare interesting information for the press

Organize and carry out site

Develop an information hotline

Prepare and carry out public meetings and workshops

Carry out interviews, surveys, focus groups and coffee meetings

Organize school campaigns, walks and other public events

Prepare and disseminate documentary films.

Chapter Six

Socio- Economic Issues

6.1 COMBATING POVERTY

A. INTRODUCTION

Poverty is a condition where the basic needs of human beings (shelter, food, and clothing) are not being met. In many countries, poverty is common and persistent, being reflected in poor nutrition, low life expectancy, imbalance between available income and the expenditure that is necessary for obtaining a certain material level of living, and high levels of infant mortality. It may result fro
of resources, and an inability to achieve economic development.

surveys in 1990 and 1991, and the 1992 government incomes survey identified the most severe pockets of poverty among the urban poor (especially squatter areas), refugee camps, and remote rural areas suffering the triple ravages of low investment, recession and drought.

The links between rapid urbanization, rural urban migration and pockets of urban poverty are clear. The urban poor often lack adequate access to health, water, sanitation, and other basic services whether due to their own economic limitations or to the inability of municipal services to keep up with the rapid and spontaneous expansion of peri-urban squatter belts.

B. PROGRAM AREA

1st. COMBATING POVERTY PROGRAM

Objectives

a. To enable all Jordanians to achieve sustainable livelihoods.

b. To provide all persons with the opportunity to earn sustainable livelihoods.

Three. To develop an integrated strategy for sound and sustainable management of poverty stricken areas.

Basis for Action

High unemployment rate
Large Jordanian family size.
High population growth rate.
Economic recession in Jordan since 1996.
Low level of education and vocational training among the poor.
Ongoing regional instability that in many

Activities

1. **Promote and encourage poor people to seek education. Education both raises the chances of getting employment, and gives access to better pay jobs. A household headed by a person without any education has 8 times the risk of being poor compared with households headed by people with post-secondary education**

2. **Combat the root causes of poverty such as hunger, illiteracy, inadequate medical and childcare, lack of employment and population pressures.**

3. **Provide micro-finance to start small businesses, which entails providing a job opportunity and increasing productivity in a sustainable manner.**

4. **Establish community based learning centers for sustainable development with the full participation of local community and drawing on their expertise.**

5. **Provide poor people access to information, education and appropriate means to enable them decide freely and responsibly on the numbers and spacing of their children.**

6. **Promote breast feeding at least during the first four months post partum.**

Provide all citizens with the opportunity to earn sustainable livelihoods

Improve the infrastructure of low-income communities, improving job skills of the unemployed poor

7. Promote, expand and improve the quality vocational training programs to develop the skills of students entering the labor market.

8. Establish a national credit program with financial sustainability and micro-enterprise credit expertise.

9. Create and provide effective sustainable support services for small and micro-enterprises, to help startups or promote faster growth.

10. Increase the amount and relevance of technical and vocational training programmes, especially those targeting poor, unemployed Jordanians.

11. Launch a public information program that aims at changing attitudes towards the relatively low-wage and low status jobs which Jordanians tend to reject, where foreigner guest workers are now predominant.

12. Promote thorough health programs or facilities, which include women-centered and woman managed, safe and effective reproductive health care, as well as affordable, accessible services for responsible family planning.

13. Place trainees within firms for on-the-job-training after receiving basic technical training in classrooms.

14. Improve the infrastructure of low-income communities, improving job skills of the unemployed poor and the labor market information systems, and strengthening the institutions supporting micro-enterprise development.

6.2 YOUTH IN SUSTAINABLE DEVELOPMENT

A. INTRODUCTION

Youth make up nearly one quarter of

to determine their future. Their role in the protection of the environment and involvement in decisions on environment and development is critical to the long-term success of achieving sustainable development.

B. PROGRAM AREA

1st. YOUTH PROGRAM

Basis for Action

Though Jordan is viewed as a youthful society, youth are not yet given the appropriate care nor encouraged to participate in the decision making process and in the sustainable development process.

youth:

- A rise in the number of unemployed youth and consequently increasing poverty among youth.
- Rising number of youth using drugs resulting in drug addiction.
- Lack of institutions, programs and activities geared to meet the needs of youth.
- Lack of information and awareness programs in the fields of health, prevention of diseases and environment.
- Early marriage, that puts extra economic pressures on youth.

Objectives

One. Reduce current levels of youth unemployment.
Two. Combat human rights abuses against young people.
Three. Establish a process and mechanisms to promote dialogue with the youth and provide access to information

Activities

1. Provide youth with adequate care and attention.
2. Enable youth to play an energetic and motivated role in Jordanian society.
3. Help concerned institutions to encourage youth to pursue education.
4. Encourage youth to accept jobs that most now see as not acceptable.
5. Enhance public awareness of youth about problems that endanger their health such as sexuallytransmitted diseases, the use of drugs and its impacts on their health and the country as a whole.
6. Ensure young people a secure future, including healthy environment, improving living standards, education and jobs.
7. Educate youth on how to get employed (learn typing and computer skills, read career magazines, learn more than one language, whatever job you get give it your best, etc.)
8. Promote active involvement of youth in the protection and conservation of environment.
9. Build the capacity of the youth to live in a healthy environment, enjoy improved living standards, and get better education and job opportunities.
10. Combat human rights abuses against youth especially young women and girls.
11. Educate and raise youth awareness about the environment and sustainable development throughout their schooling.
12. Encourage youth to participate in decisions that affect the environment.

Combat human rights abuses against youth especially young women and girls

6.3 ACTIONS IN THE FIELD OF CHILDREN

I. INTRODUCTION

Commitment to the care and protection of the children is an ethic rooted deep in Jordanian culture and society. In the past two decades, Jordan has taken giant strides on the road to health and education for all, as health centers, hospitals, schools and universities have flourished in a nation which places the highest premium on human development, and which sees, in its population, its most important resource.

The ethic of giving priority to children remains at the forefront of the national agenda, despite the economic and social pressures placed on Jordan in recent years by both regional crises and internal economic adjustment processes. In government plans and programs and in the activities of the growing family of national and non-governmental organizations, we see ever-
commitments to its children. This was affirmed most recently on an international level by Jordan government, in 1991, of the convention on the rights of the child, which

The ethic of giving priority to children remains at the forefront

declaration and plan of action of the world summit for children in 1990. In the wake of 1990 World Summit on Children, Jordan continued its work on achieving the Mid-Decade goals. These were universal immunization coverage against the 6 killer diseases, oral re-hydration therapy, provision of education for all, universal salt iodination and ratification of the convention on the Rights of the Child. All were reached in 1995.

It is clear that many problems facing children in Jordan today are due to recent economic stagnation, which has left many adults unemployed and shifted much stress to children.

II. PROGRAM AREA

A. CHILDREN AWARENESS PROGRAM

Basis for Action

Decline in family incomes, coupled with drops in nutrition, health, hygiene and education levels of children, all contribute to environmental degradation and tend to negatively impact youth the most.

There has been an increase in malnutrition among children due to the difficult economic circumstances facing many people in the past four years.

There is a growing phenomenon of children between 6-8 years on the streets to earn money to sustain their families.

Child labor exists in Jordan, though it is considered illegal.

Child abuse is thought to have increased due to the economic stress endured by poor families in recent years.

Objectives

One. Educate families about the impacts of environmental degradation on children and make them aware of the importance of

environmental protection, and of giving extra care and attention to children.
Two. Ensure a proper consideration of children: encourage and assist them to continue their education, protect them from pollution and toxic substances; provide them with adequate nutrition.
Three. Prevent child abuse and child labor.
Four. Improve the economical situation and provide job opportunities for families whose children are forced to leave the school or sweep streets to make a living.
Five. Promote primary environmental care activities that both address the basic needs of co
household and community environments.
Six. Mobilize communities, using schools and local health centers as focal points to sensitize communities about environmental issues

Environment ally aware women could bring up a generation with positive attitudes and behaviors towards the environment

Activities

1. Provide youth with adequate care and attention.
2. Enable youth to play an energetic and motivated role in Jordanian society.
3. Help concerned institutions to encourage youth to pursue education.
4. Encourage youth to accept jobs that most now see as not acceptable (and are currently accepted only by foreign workers).
5. Enhance public awareness of youth about problems that endanger their health such as sexuallytransmitted diseases, the use of drugs and its impacts on their health and the country as a whole.
6. Ensure young people a secure future, including healthy environment, improving living standards, education and jobs.
7. Educate youth on how to get employed (learn typing and computer skills, read career magazines, learn more than one language, whatever job you get give it your best, etc.)
8. Promote active involvement of youth in the protection and conservation of environment.
9. Build the capacity of the youth to live in a healthy environment, enjoy improved living standards, and get better education and job opportunities.
10. Combat human rights abuses against youth especially young women and girls.
11. Educate and raise youth awareness about the environment and sustainable development throughout their schooling.
12. Encourage youth to participate in decisions that affect the environment.

6.4 SUSTAINABLE DEVELOPMENT

A. INTRODUCTION

Women, who make up half the

It is very important to ensure a gender perspective is well integrated into policies relating to all sectors of the economy and society

participate more in defining policies and programs for sustainable development. The rapid socioeconomic and political changes that are taking place locally and globally are producing many challenges and problems. During this transitional period, it is very important to ensure a gender perspective is well-integrated into policies relating to all sectors of the economy and society.

Jordan has recognized the importance of fully integrating women into all development activities. This has been exemplified in the reduction of gender gaps in many areas such as education and health. Also, the issuing of the National Strategy for Women by the Jordanian National Committee for women, in collaboration with all national parties, was a major

Despite this progress, the issues Jordanian women and the environment are still not clearly identified. It is important to direct research towards clarifying these issues and assessing specific needs.

B. PROGRAM AREA

A. INTEGRATING AND EMPOWERING WOMEN FOR

Women are directly responsible for the management of family affairs

SUSTAINABLE DEVELOPMENT

Basis for Action

Increase awareness of environmental health issues

levels of decision making and planning, especially that related to the use and management of resources and protection of the environment, is minimal, in spite of the gradual increase of percentage of educated women.

and conservationists of natural resources are not properly valued and suffer from poor general understanding and awareness.

Environmental awareness programs relating to the use of and exposure to agricultural pesticides and herbicides are not directed at the rural women who are nevertheless major users of these products.

Uneven geographic distribution of population

Women are directly responsible for the management of family affairs. Awareness programs have to be directed to them to assure their contribution to sustainable development process.

Women are the ones primarily responsible for raising children; they also form a considerable percentage of basic education teachers. Environmentally aware women could bring up a generation with positive attitudes and behaviors towards the environment.

The percentages of poor women and of women heading households are increasing. Training them to adopt environmentally sound income generating projects is essential.

The total fertility rate reached 4.5 (1994 census and the accompanying survey), which implies a high demand for accessible health services and a high burden on the woman and her family.

The existing network of NGOs is reaching women even in very remote areas. Provision of technical know-how and skills will facilitate the process of raising environmental awareness.

Objectives

One.
participation and involvement in the protection and conservation of natural resources.
Two.
environmental conservationists and protectors.
Three.
awareness of environmental health issues.
Four. Improve women environmental management skills.

Activities

1. Programmes to raise awareness directed at the grass roots as well as at decision-makers at all sectors.
2. Develop environmental awareness-

reach out to poor rural areas.
3.
techniques of lobbying in support of environmental policies, laws and regulations, and against negative environmental practices such as abuse of pesticides in food production.
4. Develop environmental conservation activities involving all community sectors (girls, youth, and women...) such as cleaning the environment, recycling and reuse of products.

Population age structure with a high percentage of young population and accordingly a high dependency rate

Poverty and environmental degradation are closely interrelated

5. Incorporate issues such as family size and non-traditional roles for girls and women as critical elements on environmental education programs.
6. Document and build upon -diversity management, such as the use of native plants for medical and cosmetic purposes as well as food production.
7. Involve more women in urban and rural planning and in awareness campaigns, helping them obtain information on primary health care, family planning services, etc.
8. Train rural women on the control of desertification through re-establishment of pastures and improvement of irrigation techniques.
9. Train women on methods for reducing the use of pesticides, herbicides and other chemical products in their households and in agriculture.
10. Train rural women on best practices in livestock breeding, including preventing the use of hormones and growth proteins and raising animals in an environmentally sound, sustainable and healthy manner.
11. Train women on techniques for conserving water and energy, which they can use to educate their children.

6.5 POPULATION ACTION PLAN

I. INTRODUCTION

The population of Jordan has a history of sudden shocks and changes to its

rapidly during the past four decades. The population growth rate is very high due to a decrease in mortality rates resulting from the providing health care and medical facilities to the general public. Political instability and military conflicts in the region fostered several waves of migration to Jordan by Palestinians. Manpower shortage that prevailed in Jordan during the energy crisis of the mid-
large number of non-Jordanians workers to service the domestic economy.

II. PROGRAM AREA

1st. POPULATION BALANCE PROGRAM

Basis for Action

The following characteristics are considered strong justifications to move into action in this field:

Rapid increase in population leading to an unbalanced utilization of natural resources and to increased environmental pollution.

Uneven geographic distribution of population.

Population migration, both internal movements (from rural to urban areas) and immigration from outside the country.

Acceleration of urbanization.

Population age structure with a high percentage of young population and an accordingly high dependency rate.

A high proportion of the population in schools, universities and other educational institutions.

Low female participation in the economy.

Rising unemployment rate among new entrants to the labor market.

Rising demand for basic social needs, environmentally sound and healthy facilities and services such as education, housing, energy and water.

Widening gap of income distribution and an overall increase in poverty.

Objectives

One. Promote family planning and population education.
Two. Undertake policyoriented population research to identify ways to satisfy future subsistence, income and lifestyle needs, within the bounds of natural resources availability.
Three. Expand and continue the National Health Program for birth spacing.

Reorient existing production and consumption patterns, promoting greater efficiency in production and designed to optimize resource use and minimize waste

Four. Achieve more balanced geographical distribution of population.
Five. Reduce unemployment and increase female participation in economic activities.

Activities

1. Raise the levels of awareness and knowledge about population and family planning, through comprehensive media campaigns and all other available means of communication, to foster true understanding among women of the nature and importance of family planning.

2. Set-up a project with the Ministry of Education to improve the quality of education in all stages, to ensure basic education for all and to limit dropout rates. This project should also increase enrolment rates in secondary education, linking it to needs of both society and development and eliminating illiteracy, especially among rural women.

3- Expand family planning services in projects implemented by the Ministry of Health. These projects should aim to expand family planning services, increase the contraceptive prevalence rate (currently 55%) among married women, and provide effective educational and media materials on reproductive health, including family planning and birth spacing.

6.6 PATTERNS OF CONSUMPTION ACTION PLAN

A. INTRODUCTION

It is recognized that consumer rights and responsibilities include the rights to a clean and healthy environment, to safety, of access to information, of choice, and of meeting basic needs. On the other hand, consumers are responsible for protecting the environment, by adopting environmentally friendly practices and consumption patterns.
In that regard, it is important to pay special attention to over-consumption by certain segments of the society that negatively affect the environment.

B. PROGRAMME AREAS

A. PROMOTING SUSTAINABLE PRODUCTION AND CONSUMPTION

Basis for action

Poverty and environmental degradation are closely interrelated. While poverty results in certain kinds of environmental stress, the major cause of the continued deterioration of the global environment is unsustainable patterns of consumption and production.

Measures to be undertaken (for the protection and enhancement of the environment) must take fully into account the current imbalances in the patterns of consumption and production.

Special attention should be paid to the demand for natural resources generated by unsustainable consumption and to improving the efficiency of use of those resources consistent with the goal of minimizing depletion and reducing pollution.

Objectives

One. Increase the recognition of the importance of addressing consumption through identifying the role of consumption in relation to economic growth and population dynamics in order to formulate coherent national policies.

Two. Reorient existing production and consumption patterns, promoting greater efficiency in production and changes in consumption patterns designed to optimize resource use and minimize waste

Develop a domestic policy framework that will encourage a shift to more sustainable patterns of production and consumption

Assist individuals and households to make environmentally sound purchase decisions

Three. Strengthen emerging positive trends and processes aimed at achieving significant changes in the consumption patterns of industries, governments, households and individuals.

Four. Promote patterns of consumption and production that reduce environmental stress and meet the basic needs of people.

Five. Develop a better understanding of the role of consumption and how to bring about more sustainable consumption patterns.

Activities

1. Adopt a national approach to achieving sustainable consumption patterns

2. Develop policies that promote sustainable consumption, while guaranteeing the provision of basic needs for the poor, and discouraging unsustainable consumption patterns.

3. Expand or promote databases on production and consumption, and develop methodologies for analyzing them.

4. Analyze the relationship in Jordan among production and consumption, environment, technological adaptation and innovation, economic growth and development, and demographic factors.

5. Examine the impact of ongoing changes in the structure of modern industrial economies away from material-intensive economic growth.

6. Consider how economies can grow and prosper while reducing the use of energy and materials and the production of harmful materials.

B. NATIONAL POLICIES AND STRATEGIES TO PROMOTE SUSTAINABLE CONSUMPTION PATTERNS

Basis for Action

The same basis for action under A applies to this program area

Objectives

One. Promote efficiency in production processes and reduce wasteful consumption in the process of economic growth.

Two. Develop a domestic policy framework that will encourage a shift to more sustainable patterns of production and consumption.

Three. Reinforce 1. values that encourage sustainable production and consumption patterns and 2. policies that encourage the transfer of environmentally sound technologies to the country.

Activities

1. Encourage greater efficiency in the use of energy and resources through: the dissemination of existing environmentally sound technologies, research and development in environmentally sound technologies, environmentally sound use of new and renewable sources of energy, environmentally sound and sustainable use of renewable natural resources.

2. Minimize the generation of wastes through: encouraging recycling in industrial processes, and at the consumer level, reducing wasteful packaging of products, and encouraging the

introduction of more environmentally sound products.

3. Assist individuals and households to make environmentally sound purchase decisions.

4. Encourage the emergence of a more environmentally conscious consumer public, and of an increased interest on the part of industries, in providing environmentally sound consumers.

5. Encourage expansion of environmental labeling and other environmentally related product information programme designed to assist consumers to make informed choices.

6. Encourage the emergence of an informed consumer public and assist individuals and households to make environmentally informed choices by providing proper information on the consequences of consumption choices and behavior so as to encourage demand for environmentally sound products and use of products.

Enhance mass communication, education, and training programs to promote sustainable life styles

7. Make consumers aware of the health and environmental impact of products, through such means as consumer legislation and environmental labeling.

8. Encourage specific consumer-oriented programs, such as recycling and deposit/refund systems.

9. Exercise leadership through government purchasing practices The Jordan government should play a role in consumption, since the public sector plays a large role in the economy and can have a considerable influence on both corporate decisions and public perceptions. They should therefore review the purchasing policies of their agencies and departments so that they may improve, where possible, the environmental content of government procurement policies, without prejudice to international trade principles.

10. Move towards environmentally sound pricing. Without the stimulus of prices and market signals that make clear to producers and consumers the environmental costs of the consumption of energy, materials and natural resources and the generation of wastes, significant changes in consumption and production patterns seem unlikely to occur in the near future.

11. Promote the use of appropriate economic instruments to influence consumer behavior. These instruments include environmental charges and taxes, deposit / refund systems, etc. This process should be encouraged in the light of country - specific conditions.

12. Reinforcing values that support sustainable consumption. Governments and private - sector organizations should promote more positive attitudes towards sustainable consumption through education, public awareness programs and other means, such as positive advertising of products and services that utilize environmentally sound technologies or encourage sustainable production and consumption patterns. In the review of the implementation of Agenda 21, an assessment of the progress achieved in developing these national policies and strategies should be given due consideration.

13. Enhance mass communication, education, and training programs to promote sustainable life styles.

Chapter Seven

Information for Decision Making

I. INTRODUCTION

A national Environmental Information Strategy has been prepared and is published as an annex to this document

A national Environmental Information Strategy has been set by many of the same Jordanian specialists who prepared the following chapter. That strategy (provided in Annex 2) complements and supplements this chapter.

Chapter 40 of the global Agenda 21, developed at the Earth Summit in 1992, addressed the importance of accurate and timely information as a powerful resource in support of sustainable development. In sustainable development, every one is considered to be a user and a provider of information. It is emphasized that decisions at any level should be based on sound information. Attention needs to be paid to the serious gap in the availability, quality and accessibility of data between developed and developing countries. The latter often suffer from a general lack of capacity for 1) the collection and assessment of data, 2) the transformation of these data into useful information, and 3) the subsequent dissemination of this information. Bridging this information gap is essential to ensuring that decisions can be based on sound information.

Post-industrial society will be an information-driven and information-intensive society

Technologies in general and computer and communications technologies in particular were initially seen as the major driving -

The coordination of information-related activities across all sectors of the Jordanian economy must be a collective effort at the

however, it is increasingly recognized that the real driving force is the information underlying these technologies rather than the technologies themselves. The reason why technology - and computer and communications technology in particular - appeared to be so prominent is that they are concerned mainly with the production, processing and transmission of information and knowledge. Information and knowledge are the new critical resources.

It is generally accepted without question today that post-industrial society will be an information-driven and information-intensive society. The relative positions of nations, groups and individuals within this society will be determined to a large extent by their capacities for collecting, organizing, analyzing, distributing, protecting and using information for a diverse range of activities.

Humanity is facing a number of challenges that are global in nature and require global responses. These include socio-economic problems such as poverty and new diseases, environmental problems such as air pollution, marine pollution, soil pollution, depletion of the ozone layer, and a growing number of problems which defy easy categorization such as the depletion of non-renewable natural resources, water resource degradation spread over whole regions of the world, overpopulation, large number of very rapidly growing but poorly planned and serviced urban areas, etc. Humanity has responded to these challenges by creating structures that are increasingly global in nature.

On a related front, there has been a highly visible globalization of the world economy in recent years. Nations, groups and individuals are increasingly obliged to plan for their economic future within the context of intense global competition. This

Transform existing information into forms more useful for decision-makers

globalization brings with it risks such as those of eroding national cultural identity, of emphasizing foreign values over domestic values, and of international standards overriding local laws and regulations. This new global economic environment is adding new challenges to those already faced by every nation, group and individual.

Rapid developments in all information-related technologies is threatening to create new international and social stratification separating information rich societies from information poor ones and widening the gap between producers of information and knowledge and the users of these new commodities.

Information is pervasive in nature. As a result, planning and implementing activities related to the use and management of information is highly complex. Not only does information touch every aspect of human activities, but also strong inter-action and inter-dependence among different sectors characterize it. Changes in the way information is handled in one sector of the economy, for instance, will directly or indirectly affect other sectors. The coordination of information-related activities across all sectors of the Jordanian economy must be a collective effort at the national level. This is the best way to obtain desirable economic and social outcomes, while guiding the inter-relationships among economic management, computer and communications technologies and confidentiality of information.

While recognizing these challenges, Jordan also recognizes that the emergence of new critical resources of information and knowledge brings with it great opportunities. Not only is information a non-depletable resource, but there are valuable stocks of information which can be developed and traded on the emerging domestic and international information markets. The

II. PROGRAM AREA

A. IMPROVING THE AVAILABILITY OF INFORMATION

Basis for Action

There are needs for

1. increased collection of data relevant to sustainable development,
2. improved coordination among information management activities,
3. improved methods for data analysis and assessment, and
4. development of indicators of sustainable development.
5. transforming existing information into forms more useful for decision-makers,
6. developing the proper mechanisms to permit efficient and harmonized information exchange,
7. developing procedures for documenting and sharing available information, and
8. developing and facilitating electronic networking capabilities.

There are problems of:

- inadequate information management,
- lack of awareness of the value and availability of information resources,
- shortages of the financial resources and trained personnel needed to effectively manage information,
- lack of technology for effective access to information.

The emerging global economic system is increasing the inter-actions and inter-dependence among many

as a whole and the multiple components of the global economy. This inter-dependence makes it critical to possess a maximum of knowledge about all of these components and the relationships among them. Such knowledge can only be a acquired through a systematic and coordinated build-up of national information infrastructures and enhancement of their capabilities in collecting, analyzing and disseminating appropriate, timely and accurate information. This must be developed through a national information policy initiative, serving

and supporting the sustainable development process in Jordan.

Establish a national environmental information network

A serious information gap exists in Jordan on issues related to sustainable development. Access and management of relevant information about the state of the environment, and about the current trends and policies related to sustainable development are highly problematic. Much of these data and information already exist

universities, research centers and other institutions. Yet these institutions still encounter difficulties in sharing this information and making it available to others. When information is made available, it is sometimes not in the formats or forms needed by other users.

Objectives

One. Ensure the effective and efficient collection, analysis and use of data and information both in public sector institutions and in the private sector.

Two. Strengthen and improve existing mechanisms of information processing and exchange, and strengthen capacities in information handling and distribution, dissemination and communication.

Three. Strengthen the national environmental information and knowledge base through monitoring systems, systematic reporting on the environment, computer networks and other information systems, and national and international institutional partnerships.

Activities

The following activities should be carried out by different government agencies and socio-economic groups to promote the improved use of information for decision making in support of sustainable development in Jordan:

1. **Strengthen the capacities of computer and information centers in public institutions in order to ensure availability of information in the forms and formats needed by national information users.**

2. **Establish computer and information centers, where**

Strengthen and encourage the role of

private sector software industry

needed, in public institutions.

3. **Ensure information accessibility to all relevant parties, with clearly defined criteria regarding restricted information.**

4. **Establish computer networks making all information related to Jordanian laws and regulations available to concerned institutions and parties.**

5. **Establish a national environmental information network and strengthen the role of the National Committee for coordinating environmental information.**

6. **Establish a national water management information system.**

7. **Establish a national environment pollution monitoring system that covers water, soil and air. The system should establish proper linkages among laboratories, monitoring stations and local industries.**

8. **Establish a computer network to facilitate exchange of information related to sustainable development among NGOs. And encourage sharing of information on sustainable development through improved networking and coordination among**

   sector and the public at large.

9. **Establish a social affairs information cluster, which includes databases and a network of information centers ensuring the availability of information to decision-makers and researchers in the field of social affairs.**

10. **Establish an information system to provide information as a tool empowering rural communities. The system should enhance the dissemination of information to rural communities by providing easy access to data and information of interest to these communities.**

11. **Strengthen and encourage**

    sector software industry.

12. **Establish a Digital Data Transmission Network covering all of Jordan.**

13. **Encourage the development of practical applications of Geographic Information Systems.**

14. **Develop a mechanism for using a unified national coding system among all environment-related institutions.**

15. **Develop sustainable development indicators to provide a solid base for decision making at all levels. (See chapter 10 on the monitoring of the**

    Agenda 21.)

16. **Improve information availability by reviewing and reforming the national information system and services related to sustainable development, emphasizing the need to**

    information base into forms better matched with the needs of decision makers.

The UNDP-funded Sustainable Development Networking Programme (SDNP) aims at establishing a mechanism geared towards helping Jordan achieve its sustainable development goals. This is the first phase of a long-term undertaking to provide Internet connectivity and access to information related to sustainable development for all project stakeholders, as well as for beneficiaries of sustainable

Chapter Eight

Projects

I. WATER RESOURCES PROJECTS

The following projects are considered of high priority for integrated water management and sustainable use of water resources for the water and irrigation sector in Jordan.

1. Water Resources Assessment Projects

The aim of these projects is to establish modern surface and groundwater systems; these include:

One) **Installation of volumetric measurement devices to all, public and private wells in order to assess groundwater abstraction rate.**

Two) **Expansion of the network of observation wells specially in deep aquifers of Azraq, Yarmouk, and other basins.**

Three) **Establishing a water quality network and quantity network for major rivers and wadis.**

2. Water Feasibility Studies

These studies are for the assessment of resources pertaining to deep groundwater, fossil, and brackish water in the Kingdom for the purpose of development of groundwater basin management plan.

3. Rehabilitation of Water Distribution to Urban Areas

These projects aim at regular rehabilitation, maintenance of water distribution in major cities and towns in the country in order to reduce water losses.

4. Construction of National Water Carrier

This includes installing the Disi-Amman conveyer, JV-Amman conveyer, JV-Irbid conveyer and a national water carrier with all inlet and outlet conveyer from sources to demand areas. Sources include; network, desalination plant, peace water, imported water, Jordan Valley water and spring waters.

5. Water Desalination Project

Study for desalination of brackish water in Jordan proved to be feasible (JICA, 1995). There is a potential of desalination of 130 MCM in the Jordan Valley. There is also potential for desalination of fossil water in many parts of the country. Seawater desalination in Aqaba is possible to provide the area with fresh water supply. The following projects can be identified:

- **Pilot desalination project**
- **Short term desalination projects**
- **Long term desalination projects**
- **Desalination of sea water at Aqaba**
- **Desalination conveyer to urban areas**

6. Wastewater Treatment and Networks Projects

This includes the rehabilitation of sewage networks and treatment plants for major cities (Amman, Irbid, and Zarqa). Expansion of existing projects will be carried out along with inclusion of the Jordan Valley Area.

There is also the need to provide other towns and villages with sewage network and treatment plants.

7. Projects Related to Augmentation of Water Supply

These projects include the construction of Wihda Dam, regulating the Yarmouk flow, building small dams on the side wadies of the Jordan Valley and wadies facing the Dead Sea and Wadi Araba, and water harvesting projects in the Badia Region to optimize the use of floods.

8. Institutional Restructuring Projects

These projects aim at updating institutions for optimization of management of water resources.

9. Human Resources Development Project

Aims at capacity building of personnel working in the water sector.

10. Irrigation Network and Canal Improvement Projects

These projects aim at increasing water use efficiency in the agricultural sector.

11. Water Importation

There is a potential for water importation from the region such as the Peace Pipeline from Turkey and the water transport from Euphrates either from Iraq or Syria. However, implementation of these projects would need and depend upon regional cooperation.

12. The Red-Dead Canal

This is a multipurpose project to produce energy, which can be used as such or used for the purpose of desalination. If it is used for a freshwater production, it can produce about 500 MCM.

II. AGRICULTURAL SECTOR

The following suggested projects are listed according to their priority in terms of funding and implementation in Jordan throughout the initial stages of the 21st century.

1. Management of Crop, Water and Nutrients Needs Under Soil -Water Regimes

It is well known that crops vary widely in their water and nutrients requirements. These requirements are determined by the type of crop and the dominant climatic conditions. Unfortunately these demands are not precisely estimated for crops in Jordan, whether under irrigated or rainfed conditions. Over-fertilization could contaminate the water resources while over-pumping would lead to the deterioration of groundwater quality.

In order to minimize the application of fertilizers, investigation of the contribution of nitrogen fixation to the soil nitrogen content and the application of manure to the soils have to be considered in determining the nutrients demand by crops.

2. Soil Management under Irrigated and Rainfed Conditions

The area of cultivated land is continuously shrinking in Jordan due to many reasons. Among such reasons are urbanization, desertification and poor management of land manifested in the misuse of fertilizers, pesticides, and the improper ploughing that results in developing hard pan in the clay soils.

The effect of these adverse operations on the soil properties has to be evaluated both in irrigated and rainfed areas. Legislation regarding the use of land has to be introduced or amended to save the cultivated land. The deterioration of

soil properties that are caused by water and wind erosion especially in the steep lands has to be evaluated and controlled. Soil conservation by building stone ridges and improving the soil structure is highly required.

3. Reuse of Treated Waste Water in Agriculture

One of the limiting factors in agriculture is the scarcity of natural water resources. Higher demands for water is expected in the next decade in agriculture, industry and domestic use. Priority will be given to sectors other than agriculture. Therefore, utilization of non-conventional water resources such as brackish and treated wastewater has to be considered.

The amount of treated wastewater is increasing and agriculture is the sector nominated for its use. In the next decade, this amount will reach about 80 MCM. In general, such water might contain pathogens, salts, and toxic organic and inorganic substances that limit its use, unless the treatment is performed properly. However, the use of such water is obligatory under the Jordanian regulations. Thus, maintaining the quality of such water at the stipulated standards is mandatory.

4. Improving Local Livestock by Artificial Insemination and Embryo Transfer

Jordan suffers from shortages in red meat and animal products and depends mainly on imports. Although the local breeds are adapted to the local environment and resistant to many diseases, their productivity is far below the foreign varieties. The local breeds are even threatened to disappear.

Establishing cross-breeding programs to improve the quality and the productivity of local livestock is of great importance. One of the techniques used for that purpose is artificial insemination and embryo transfer. Such a program requires well-qualified specialists and well-equipped labs.

5. Integrated Pest Management (IPM)

The last decades have witnessed an increase in the use of chemical pesticides in order to control crop diseases. Although these chemicals play an important role in controlling crop diseases, and in turn, increase the yield (and to some extent improve the yield quality), unfortunately, the hazardous effect was recognized only recently. There is evidence that many of those chemicals are carcinogenic, teratogenic or mutanogenic. As a result, strict standards have been set up on their presence in the crop yield. The residual amounts of these chemicals in the agricultural products determine their use or the possibility of their exportation to foreign countries.

A new approach, the Integrated Pest Management Approach (IPM), has been developed to limit the use of these chemicals by using natural biological control. Research in this regard has to be intensified and funded.

6. Introducing New Crops of High Gross Margin

The total irrigated land in Jordan is limited and half of which is in the Jordan valley. The area is distinguished by its location (400m below the sea level) and by its climate conditions particularly in winter. The available water resources are limited and insufficient to irrigate the available acreage along the year. In addition, certain areas are affected by high salt content of soil. Farmers grow crops regardless of their economic return. Therefore, to maximize the use of water and land resources, new crops have to be introduced such as seedless grapes, date palm, and avocados. The high gross margin of growing such crops is encouraging under the dominant climatic conditions, since they are salt-tolerant crops and mature quickly.

7. Recovering Animal Feed from Plant Debris

There is a gradual disappearance of the local livestock due to shortages of feed. Imports represent the major source of feed. The prices of the imported feeds have increased significantly and raising animals became unfeasible.

Research has to concentrate on alternative sources such as crop residues, and the by-products of food industry (including olive and tomato residues and citrus bulb...etc) .

8. Establishing a Certification Program

Potato seed tuber and some vegetable seeds are being produced in Jordan. In order to assure the quality, a certification program is deemed necessary. The program should include field surveys, assessment and laboratory tests. Certification programs should be supported with research in different fields like horticulture, entomology and virology that intimately affect seed quality such as, incidence of viruses and damage caused by insects. The program can stem out only from legislative provision.

Other certification programs could be thought of to ensure the quality of agricultural produce, such as vegetables and fruits. Such programs could also encourage cultural practices that are friendly to the environment including IPM and organic culture.

9. Upgrading Agricultural Labor Force

The scarce agricultural resources in Jordan necessitate intensive use of new technology to increase productivity. Such attempts are usually hampered by the lack of well-trained agricultural technicians. Since most of the agricultural laborers are unskilled foreigners, the need arises to increase vocational training in agriculture. This can be achieved through increasing the number of agricultural high schools, community colleges, and upgrading the curricula. The expected output can slowly replace the foreign labor force. This should be coupled with labor law provisions so the Labor Law and the social security program cover those agriculture laborers.

10. Water Spreading in Marab

The Eastern part of Jorda

restricted to this path until it reaches its estuary. It is likely to increase the area of flooding along such paths by establishing stone ridges to channel the water to the arms of the stream paths. Such a technique will supply water to more acreage that can be used to grow barley.

11. Restructuring Agricultural Research Activities

Agricultural research is carried out mainly in the universities and the National Agricultural Research and Technology Transfer (NCARTT). Most of the mission-oriented research is conducted in NCARTT which executes its mandate through stated objectives to improve the production systems.

The objectives are so diverse that they spread thin to cover all components. The current situation is expected to provide some information but never attains mission level. The efforts are to be consolidated and restructured in units rather than programs. This will provide flexibility of interaction between different units, the private industry and other research and development institutions. Suggested units to be structured are:

1. **Biotechnology unit.**
2. **Plant breeding unit.**
3. **Animal production.**
4. **Plant production.**

12. Disease-Free Repositories for Fruit Crops

Productivity of fruit plantations in Jordan is fairly low due to many factors among which is using virus-infected propagative material. There is no way to cure such virus-infected trees. Prevention is the only possible means of control, i.e. bud wood has to come from healthy mother trees and new planting must be established with virus-free nursery plants to produce healthy trees. Fortunately, techniques have been developed for clean varieties of virus and virus-like pathogens. These could be kept clean through a monitoring program in a healthy bank of germplasm and virus-free mother trees. The bud wood from these trees should be available for nurseries and growers. The system should be supported by legislative regulations and certification program.

13. Introducing Drought and Salt-Resistant Crops

Salts affect certain cultivated lands particularly in the southern Jordan Valley and in the eastern part of Jordan. The available irrigated water in terms of quantity and quality is limited. Brackish water is available in some areas. Therefore, introducing or developing drought and salt-tolerant crops must be encouraged to increase the agricultural production and to make use of poor quality water.

C. ENERGY SECTOR PROJECTS

1. Oil Shale Utilization

Project status

Jordan is setting with plans to extract some 40 billion tons of known oil shale resources in central rted crude oil.

Environmental assessment

No environmental constrains are anticipated on oil shale development, if all the necessary international environmental mitigation techniques are explicitly enforced.

2. Renewable Energy

Extensive studies have been conducted on wind activity and solar power in Jordan. Two major wind farms have been successfully operating in Jordan producing more than 4 million kWh of pure electricity per year.

o thermal energy useful for electricity production is by concentrating it at one central receiver by means of mirrors. Other forms of solar-electric conversion systems are photo-voltaic, solar ponds, sterling engines, solar chimney, energy tower.

Hydraulic power conversion, bio-gas and bio-mass are other forms of renewable energy systems. Other technologies related to renewable and new energy systems are: fluidized bed combustion, integrated gasification combined cycle fusion power, fuel cells, battery storage, compressed air, pumping storage and magnetohydro dynamics.

Project objectives

- **Develop oil-**

and to cope with global environmental issues.

- **To switch to new and highly efficient and environmentally superior energy technologies**
- **To formulate a coherent series of policies aimed at moving efficiently the present energy structure to a more sustainable and diversified structure of energy demand and supply.**
- **To assist the current and future shares of renewable energy sources**
- **To introduce the technologies of renewable energy conversion systems in Jordan and to enhance local experience and know-how in this field.**

Environmental Aspects sustainability

Renewable energy technologies form the basis for sustainable energy development. In Jordan the potential for utilization of renewable energy sources was assessed to be significant in both centralized and decentralized modes.

Development of new energy systems has an important role to play not only in the development of oil alternatives but in other likely contribution to reducing the demand pressures on the global environment.

3. Fossil Fuel Exploration

Jordan is favorably situated between the Precambrian outcrop belt and the rich oil-producing areas of the Gulf coast geo-syncline, making it a prime prospective frontier area for oil and gas deposits.

New insights into the subsurface geology gained by recent seismic work revealed the existence of deep basis of fossil fuel with attractive structural stylist which are essentially untested.

Project objectives

Any discovery of oil and gas for local use and for export would improve the national economy on the long-term. The availability of local energy resources will remain the prime factors that will determine the level and the rate of social and economic development in the future.

Environmental and social considerations

If certain measures are carefully applied along with the implementation of the stipulated local and/or international environmental regulations, most of the anticipated potential impacts can be readily mitigated through careful planning and sound management to meet the goals for environmental protection.

Global cooperation must be structured to identify ways to use fossil fuels in a manner that will be fully compatible with the sustainable development mandates for the future.

4. Geothermal

Many studies including detailed geological mapping, gravity, magnetic, geo-electric, and radioactivity measurements have been prepared, and the hydrogeology, hydro-geochemistry and

volcanicity were appraised. Heat flow measurements were determined. Several pilot plants are proposed in order to study this natural phenomenon in Jordan.

Objectives

- **Establishment of an indigenous sources of base-load energy.**
- **Diversification of energy resources.**
- **Reductions of the environmental pollution through the exploration of environmentally sound energy resources.**
- **Cheap source of warm water for heating, and possibly reducing the cost of electricity generated.**
- **Assessment of the possibility of using the available geothermal energy for fish farming, refrigeration by absorption, water desalination, heating greenhouse, medicinal aspects and for power generation.**
- **Optimization of the technical design of boreholes and improving the knowledge of the hydrodynamic characteristics of the exploited aquifers.**

Geothermal Plants

Heat is removed by flashing a portion of the brine into steam to operate a turbine. Typically, less than 15% of the thermal energy is convertible to power. An alternative binary cycle technology uses the brine to vaporize a secondary fluid with a lower boiling temperature, which in turn drives a turbine generator. Binary cycles return all the brine to the reservoir and therefore, reduce air pollution.

Advantages of geothermal plants are:
- **Low fuel and operating costs**
- **Small land requirements.**

IV. ENVIRONMENTAL MANAGEMENT SECTOR PROJECTS

1. Studies on Composition and Characteristics of Solid Waste to Provide Technical Data for Recycling and Public Awareness Program on Recycling

Project Objective

To establish a data base on the types and quantities of recyclable materials and increase the utilization ratio of Solid Waste by recycling.

Brief Description

A survey study will be conducted on the composition and characteristics of
Solid Waste as well as an education and public awareness program on recycling by media, schools, universities, etc.

Administrative-legal / organization:

GCEP , media , Universities and Ministry of Education.

2. Recycling of Organic and Inorganic Wastes in Amman-Zarka Area

Project Objective

Reduce the Cost of waste collection and disposal and reduce the impacts of the existing landfill and increase the utilization ratio of solid waste.

Brief Description

Sorting of solid waste to its constituents (glass, metals, plastic, etc.) and recycling them into new products and compost.

(i) Administrative-legal / organizations

Greater Amman Municipality, Zarka Municipality, Ministry of Rural and Municipal Affairs and Environment , GCEP, Ministry of Planning.

Remarks :

The existing land fill at Russiefeh has negative impacts on the environment and it will be closed off during the next 10, therefore it is essential to adopt other methods of disposal such as recycling.

3. Soil and Water Investigations at the Land Fill Disposal Sites

Project Objective

Identification of soil and water situation at the final disposal sites and definition of the necessary remedial measures.
Administrative-legal / organization:
GCEP, MMRAE , W.A.J.

4. Establishment of Incineration Plants for Solid Wastes in Amman-Zarka Area

Project Objective

Closure of the existing land fill at Russeifeh and reduction of its impacts on environment.

Brief Description

Establishment of two incineration plants at Russeifeh land fill of 2000 ton/day capacity by the private sector using local technologies and expertise, in addition to the establishment of a sorting mechanism for inorganic wastes manually and selling it to the local market.

5. Management of Agricultural Plastic Waste

Project Objective

To maintain safe and clean environment, prevent loss of livestock and reduce damage to soil.

Brief Description

Thirty plastic waste collection centers will be established in all major irrigated areas with the introduction of economic incentives to insure plastic collection and recycling by private sector.

Administrative-legal / organization

Municipalities, Ministry of Agriculture, J.V.A., G.C.E.P, Ministry of Planning.

6. Biogas Extraction From Organic Wastes

Project Objective

Prevent green house gases from emanating to the environment, generate electricity and provide new solid waste disposal methods.

Brief Description

Establishment of plants to extract biogas from organic waste, in order to generate electricity of 2-10 Megawatt in Amman, Irbid, Duhleil, and Zarqa.

Administrative-legal / organizations

Municipalities, M.G.A., National Electric Company, GCEP, Ministry of Planning.

7. Control of Noise Pollution

Brief Description

- **Survey the major sources of noise pollution in the general environment.**
- **Make measurements of the noise levels in risk areas and recommend a mitigation plan.**

Duration

One to two years.

Administrative-legal / organization

Ministry of Health.

8. Capacity Building of Environmental Health Laboratories and Services

Project Objective

Build capacities of environmental health services within the Ministry of Health to improve their undertakings.

Administrative-legal / organization

Ministry of Health.

9. Upgrading of Health Information System

Project Objective

Improve the existing information system to generate accurate, relevant and reliable information to be used for health planning and good assessment of health status.

Administrative-legal / organization
Ministry of Health.

10. Strengthening of Occupational Health Safety Measures

Project Objective

Ensure safe and healthy working environment to safeguard the health of workers.

Brief Description

- **Assess existing services, institutional and legislative conditions.**
- **Assess safety and health conditions in major risk areas.**

Duration
Three to five years.

Administrative-legal / organization
Ministry of Health, Ministry of labor and GCEP.

11. Encouraging and Strengthening Environmental Epidemiology Research

Project Objective

Make linkages between environmental pollution and health conditions.

Brief Description

- **Train environmental epidemiologists**
- **Implement studies on major environmental pollutants and their effects on human health.**
- **Recommend mitigation measures.**

Duration
Three to five years.

Administrative-legal / organization
Ministry of Health.

12. Establish a National Air Pollution Monitoring Network

Project Objective

Control of air pollutants and protection of public health.

Brief Description

-
- **Air sampling and analysis equipment.**

Duration
Continuous.

Administrative-legal / organizations
Ministry of Health, Royal Scientific Society and GCEP.

13. Indoor Air Quality Monitoring

Project Objective

Control of indoor air quality and public health protection.

Brief Description

- **Survey sources of indoor air pollutants.**
- **Assess levels of major pollutants.**
- **Assess health of risk groups.**
- **Recommend control measures.**

Duration
Three to five years.

Administrative-legal / organizations
Ministry of Health and the Royal Scientific Society.

14. Establish a National Network of Healthy Cities and Villages

Project Objective

Ensure safe and healthy urban/ rural environment to promote public health.

Brief Description

- **Establish a central steering committee.**
- **Establish a technical committee.**
- **Conduct workshops to raise awareness among city officials.**
- **Technical and financial support.**

Duration
Continuous.

Administrative-legal / organizations
Ministry of Health and other concerned agencies.

V. BIODIVERSITY PROJECTS

1. Establishment of General Herbarium

Project Objective

To deposit plant specimens collected from all plants in Jordan in order to have a national reference collection for further studies.

Project Description

The Herbarium would contain present, past and future plant collections from Jordan.

The project would involve staff training and facilities for classification and conservation

Requirements/ Needs

- **Studies: field works, classification, floristic revisions, electron microscopy and others.**
- **Man power: research staff at the level of Ph.D. and MSc., and well-trained technicians.**
- **Scientific equipment: microscopes (such as scanning electron microscopes) and photography facilities.**
- **Supplies: chemicals, herbarium sheets, files, presses, field vehicles,**

2. Establishment of a National Botanical Garden

b) Project Objectives

- **Presentation of local genetic material in terms of living specimens in the botanical gardens.**
- **A training center for staff and researchers.**
- **Live demonstration site for students and public**
- **Recreation center to be used for demonstration of the importance of biodiversity.**

c) Project Description

An area will be selected near Amman or any of the major cities organized in a way to contain <u>plant groups</u> as living specimens with the propagation facilities to provide continuous stock of seeds and other propagation units in the right seasons.

Duration

Five to ten years.

Requirements/ Needs

- **Studies: plant biology studies related to life cycles, propagation and pollination, etc**
- **Manpower: plant experts (botanists), gardeners, technicians, and workers.**
- **Equipment: land, green houses and propagation units, heating, water facilities, cars, trailers, tractors, etc**
- **Supplies: cooling units, gardening equipment (tools) , etc**

3. Geographical Distribution and Monitoring of Rare, Endangered and Threatened Species, Populations and Ecosystem

Project Description

- **Identification of rare, threatened and endangered species; populations and ecosystems;**
- **Identification of geographical distribution of such species.**
- **Monitoring of species and ecosystem**
- **Establishment of a related GIS system.**

Duration

Five to ten years.

Requirements/ Needs

- **Studies: scientific staff, field work and observation; (surveys; recording status of species, population and ecosystem; awareness (public, government and NGOs).**
- **Man power: botanists; ecologists; technicians; workers; students.**
- **Scientific Equipment: GIS system; data base and computer requirements; transportation facilities; cameras; binoculars, etc.**
- **Supplies: literature; library, etc.**

4. In-situ and Ex-situ Conservation of Genes, Species, Population and Ecosystems

Project Objective

In-situ conservation of genetic material in terms of species, populations or ecosystem.

Project Description

- **Identification of rare and endangered genetic materials;**
- **Identification of their localities and distribution for in-situ conservation using ex-situ conservation methods:**
- **Re-introduction of species to their natural habitat.**

Duration

Five to ten years.

Requirements/ Needs

- **Studies: studying the reproductive biology of species, the natural ecology; methods of ex-situ propagation to ensure the increasing number of such threatened, endangered rare species.**
- **Manpower: biologists (botanists, zoologists, agriculture); ecologists; technicians, workers, research students.**

- **Scientific Equipment: laboratories, transport, biotechnology facilities, (HPLS, PCR, Analyzer, etc.)**
- **Supplies: microscopes, etc**

5. Biodiversity Training Center

Project Objectives

Training of manpower needed for floristic studies, conservation, monitoring, survey, ex-situ and in-situ conservation as well as eco-tourism and public awareness.

Project Description

Establishment of a center with well-prepared programs and training facilities to produce well-trained manpower at various levels of scientific degrees/qualifications, in order to be able to work and fill the gaps needed for various aspects of biological studies

Duration

Continuous.

Requirements/ Needs

- **Studies: training courses, lectures, practical and field work in classification, ecology, field biology, conservation, ex-situ and in-situ technician, botanical gardens skills; herbarium methods and ethics.**
- **Manpower: botanists; ecologists; zoologists, field biologists, conservationist, geneticists, GI specialist.**
- **Scientific Equipment: laboratories, teaching classes and facilities, educational tools and requirements.**

6. Completion of the Protected Areas Network

There are different ecosystems, habitats, and bio-geographical zones in Jordan that have global, regional and national importance.

Human interference has caused depletion of natural resources and changed the natural ecosystem and habitats, which has led to the extinction of certain species. Therefore, the establishment of a network of the protected areas will help preserve the natural heritage and perpetuate the biological diversity of Jordan.

Project Objective

- **ecosystems.**
- **Prepare a management plan for each protected area.**
- **Develop basic infrastructure of the protected areas.**

Required Staff

- **Fifteen local experts with different fields of experience.**
- **Two foreign experts.**

Duration

Five to seven years.

7. Enforcement of Environmental Legislation Related to Biodiversity

There are two main national laws that are related directly to the establishment and management of the protected areas. These laws are: the Agricultural Law and the Environmental protection law No.12/ 1995.

Project Objective

- **Define a focal point to coordinate the implementation of environmental legislation.**
- **Establish a well-trained and prepared environmental police.**
- **Raise the level of public awareness to support the enforcement of legislation.**

Required Staff

- **Five local experts.**
- **One foreign expert.**

Duration

Two to three years.

8. Regional Environmental Training Center

The establishment of an environmental training and resource center for the Middle east will facilitate and promote the protection and sustainable development of the regional natural resources by fostering cooperation between member countries and the provision of information and expertise.

Project Objective

- **To provide training for practitioners and educators in the concepts, techniques and implementation of environmental management and sustainable development.**
- **To establish a regional database of environmental information to assist in the formulation and implementation of regional environmental policies and projects.**
- **To promote regional cooperation in the development of environmental programs.**
- **To raise the level of public awareness of regional environmental issues.**
- **To assist with the strengthening and capacity building of organizations responsible for environmental protection and management.**
- **To create and/or strengthen cooperation between the environmental organizations operating in the region.**

Required Staff

- **Ten local experts with relevant experience.**
- **Two foreign experts.**

Duration

Three to five years.

VI. TOURISM PROJECTS

Many studies have been done on the Tourism development plan in Jordan. The most recent one is the study executed by Japan International Cooperation Agency (JICA) and the study by the World Bank for the Second Tourism Development Project. Thirty-six projects and project groups were identified to be implemented. Detailed studies were prepared for ten of these projects. Among them were:

1. Amman Downtown Tourism Zone

Project Objective:

Amman as Jordan's International Gateway

Project Activities:

One) Creating Tourist Street.
Two) Establishing tourist trails.
Three) Establishing a tourist center.
Four) Creating a terminal complex.
Five) Creating a modern Tourist Information Center.
Six) Human resources development.

Implementation:
Amman Municipality with Ministry of Tourism and Archaeology (MOTA).

Cost in USD:
20.8 million.

Duration of the project:
50 months.

2. Dead Sea Panoramic Complex

Project Objective:

Broadening tour route options through enhancing the appeal and attractiveness of the Dead Sea area.

Project Activities:

One) Creating panorama lookout/rest house.
Two) Creating cable car access.
Three) Establishing Dead Sea Museum.
Four) Human resources development.

Implementation:
Jordan Valley Authority with MOTA.

Cost in USD:
19.4 million.

Duration of the project:
40 months.

3. Madaba-Dead Sea Park

Project Objective:

Establishing a circuitous tour route through a link between the King's Highway and the Dead Sea.

Project Activities:

a) Establishing Dead Sea-Ma'in Route.
b) Establishing Ma'in-Makawir Route.
c) Establishing Makawir-Dead Sea Route.

Implementation:
Ministry of Public Works and Housing with Jordan Valley Authority.

Cost in USD:
7.5 million.

Duration of the project:
50 months.

4. Kerak Tourism Development

Project Objective:

Enhancing the old center of Karak.

Project Activities:

a) Improving the Castle presentation.
b) Creating a tourist street.
c) Establishing a visitor center.
d) Establishing Castle observation points.
e) Human resources development.

Implementation:
MOTA with the Municipality of Karak.

Cost in USD:
5.9 million.

Duration of the project:
18 months.

5. Second Tourism Development Project

Project Objectives:

1. **Creating the conditions to enhance sustainable and environmentally sound tourism in Petra, Wadi Ramm, Jarash and Karak; and**
2. **Realize tourism-related employment and income-generation potential at project sites.**

The project has four components:

1. Petra Region Infrastructure Development and Environmental Management.

Activities:

a) **Developing urban infrastructure.**
b) **Improving environmental management.**
c) **Improving visitor support services at the Petra sanctuary.**
d) **Building the capacity of the Petra Region Planning Council.**

Cost in USD:
27.4 million.

Implementation:
PRC, MPWH, with MOTA

2. Wadi Ram Infrastructure Development and Environmental Conservation.

Activities:

a) **Developing infrastructure.**
b) **Improving protected area management and visitor-management services.**
c) **Creating income-generating activities for local community, particularly Bedouin women.**

Cost in USD:
9.2 million

Implementation:
ARA.

3. Karak and Jarash Tourism Development Pilot Program.

Activities:

a) **Implementing priority urban-regeneration, tourism-related projects and cultural heritage conservation activities in Karak and Jarash.**
b) **Carrying out feasibility and land use plans for the implementation of their recommendations for financing under a follow-up phase of the Government's Tourism Development Project.**

Cost in USD:

5.2 million.

Implementation:
MOTA.

4. Sector Development Support

Activities:

a) Establishing a long-term tourism development strategy and an associated prioritized investment program.
b) Conducting a legislative and regulatory study that identifies impediments to increased tourist flows and private sector participation and proposed measures for deregulation and for modernizing and streamlining the numerous regulations.
c) Working out a restructuring plan for tourism-sector public institutions, with a view toward improving their effectiveness and coordination with related line ministries and the private sector as well as toward rationalizing their role in tourism.

Cost in USD:
2.2 million.

Implementation:
MOTA.

B1. Creating a National Register of Archaeological and Cultural Resources in Jordan

Project Activities:

a) Computerized Inventory of all archaeological Resources in Jordan by the means of systematic ground surveys and Remote sensing.
b) Classification of the aforementioned resources based on a set of criteria which will include their authenticity, uniqueness, historical importance, aesthetic values, degree of preservation, accessibility , degree of urgency for intervention, etc.

B2. Updating Jordan Archaeological Database Information System

Project Activities:

a) Updating of the system by converting it from MS-DOS based program to Windows or any other suitable based program.
b) Widening the range of information by utilizing complete Geographic Information System (GIS).
c) Computerizing all the files at the Registration Section of the DOA.
d) Utilizing new technologies in data collecting and disseminating through creating networks between different Sections in the Department of Antiquities and between the Department and various research institutions in Jordan and abroad.

Implementation:
Department of Antiquities with Royal Scientific Society.

Cost in USD:
2 million

Duration of the project:
18 months

B3. Preservation and Restoration Projects

A national conservation Center need to be established in close coordination with the existing efforts initiated by MOTA, DOA and Yarmouk University in conjunction with GTZ, the Italian government and other related institutions such as the Jordanian universities and other regional and international centers.

Projects:

1. Qasr al Bint /Petra

Project objectives:

Preservation of the most important free standing Nabataean monuments in Petra.

Project activities:

a) **Full documentation of the monument through drawings and photographs with the use of modern techniques like photogrametry;**
b) **Dismantling of the upper walls of the monument and removing the old restoration materials;**
c) **Complete dismantling of the eastern wall of the monument;**
d) **Consolidation of the foundations of the monument;**
e) **Restoration of the monument;**

Implementation:
International bid with DOA.

Cost in USD:
2 million.

Duration of the project:
40 months

2. Umm al Jimal

Project objectives:

Restoration of selected monuments.

Project activities:

a) **Restoration of the "Barracks".**

b) Restoration of House number 119. Utilizing this house as a visitor center.
c) Partial restoration of the perimeter city walls.
d) Restoration of the "Praetorium".
e) Restoration of houses 116, 117, and 118.

Implementation:
DOA.

Cost in USD:
4 million.

Duration of the Project:
50 months.

3. Qasr al 'Abd/Iraq al Amir/ Amman

Project Objectives:

Rehabilitation of the area of Iraq al-Amir as a nature/culture resource.

Project Activities:

a) Improving the accessibility of the site starting from the Town of Wadi as-Sir;
b) Acquiring the lands around the Palace where the artificial lake was located;
c) Recreating the artificial lake and establishing the means by which the visitors will be taken to the Palace;
d) Partial completion of the upper part of the Palace by using light and reversible materials;
e) Establishing a visitor center.

Implementation:
DOA and Ministry of Public Works and Housing.

Cost in USD:
5 million

Duration of the project:
60 months.

d)

4. Umm Qays

Umm Qays (ancient Gadara of the Decapolis) in northern Jordan is the most visited site by Jordanians especially in the spring time. For most of the Israeli tourists and international tourists coming through Israel (and in the future through Syria) Umm Qays will be their first stop where the rich archaeological heritage of Jordan can be introduced.

Project Objectives:

Excavation and restoration of selected monuments or groups of monuments;
Improving visitor support services at the site;
Realizing tourism-related employment and income-generation potential at project site;

Project Activities:

a) Restoration works at the West Theater;
b) Restoration works at the Street-front shops;
c) Excavations and restoration works at the colonnaded Decumanus Maximus;
d) Excavations and restoration works at the perimeter eastern and northern city walls;
e) Connecting the Cardo Maximus(street-front shops)with the new parking lot;
f) Creating visitor support services;
g) Signage of all the monuments;

Implementation:
DOA.

Cost in USD:
5 million.

Duration of the project:
60 months.

5. Tabaqat Fahl (Pella of the Decapolis)

One of the most impressive sites in Jordan with almost continuos occupation starting from the Bronze Age. Pella is the closest Jordanian site to the Northern Crossing Point (ash-Shaikh Hussein Bridge) and in this capacity it is a gateway to Jordan's archaeology.

Project Activities:

a) Improving the accessibility to the site;
b) Creating visitor support services;
c) Signage of all the monuments;
d) Excavations and restoration works at selected monuments or groups of monuments;

Implementation:
DOA, MOTA, MPWH.

Cost in USD:
2 million

Duration of the project:
30 months.

6. Qusayr 'Amra

The second Jordan's World Heritage listed site after Petra.

Project Objectives:

Preservation of the cultural landscape and providing the site with visitor services.

Project Activities:

a) Establishing culture/nature reserve of 'Amra.
b) Initiating consolidation works on the frescos and establishing climate control.
c) Restoration of the main building of the complex to the north west of the baths.
d) Stabilizing the Wadi al Buttom banks;
e) Creating a visitor center;
f) Shifting the Amman-Azraq highway away from 'Amra;

Implementation:
DOA, RSCN, MPWH.

Cost in USD:
2 million.

Duration of the project:
30 months.

7. Historic Old Salt

Project Objectives:

Cultural, historical, and folklore resources preservation.

Project Activities:

a) Renovating Abu Jaber Building and converting it into a Visitor Center.
b) Beautifying public spaces and sign posting.
c) Human resources development.

Implementation:
Municipality and Salt Development Corporation with MOTA.

Cost in USD:
7.6 million

Duration of the project:
40 months.

B3. JORDAN NATIONAL MUSEUM

Project Objectives:

Presenting and interpreting Jordan's cultural heritage in a proper manner.

Project Activities:

a) **Establishing Visitor services**
b) **Exhibition Halls.**
c) **Logistic support.**
d) **Research offices.**
e) **Administration.**
f) **Auxiliary Services.**
g) **Human resources Development.**

Implementation:
Special Unit within the DOA.

Cost in USD:
14.5 million.

Duration of the project:
40 months.

Chapter Nine

Linkages for the National Agenda-21

I. INTRODUCTION

Create an inter committee between the Development Plan and the National Agenda

The achievement of the objectives of the National Agenda-21 calls for a national partnership for sustainable development where all sectors will need to make social, economic and political commitments to ensure the transition to sustainable development.

Sustainable development requires partnerships based on broad coalition of interest. The formation of such partnerships implies more than just willingness and commitment; it also requires awareness and understanding.

Concern for the environment must touch every sector and every community and institution. Towards this end, the integration of environment and development should be reflected in a re-orientation of attitudes, in a change in decision-making, in modification and strengthening of the relevant institutional arrangements at the national and local level.

Therefore, the National Agenda will have to establish links with the major groups, the NGOs, the local communities, the development plans, the scientific and professional communities, and with the international community.

II. LINKAGE WITH DEVELOPMENT PLANS

The national agenda should seek linkages with the industrial sector

As the government has formulated a new economic and social development plan, there is a good opportunity for establishing linkages to promote and advance the case for sustainability. Surely, the previous Development plan 1992-97 mentioned sustainable development as one of its guiding principles. However, this did not materialize into actions, as if the planners gave lower priority to sustainable development.

For environment and conservation, sustainability is not new. However, sustainability is not understood by policy makers, and also by the general public. But this aspect lies in the domain of raising awareness, and in the educational activities.

Needless to say that protecting the environment would be difficult unless we improve the living conditions of the poor. Without jobs, money, food, water and other natural resources, there will be little concern about conservation or the needs of future generations.

(a) One way to establish linkages, is to create an inter committee between the

should review the two documents to establish the ways and means of incorporating sustainable themes into the development plan. The formulation of this committee and the selection of its members need careful judgement. But, who will start the process, and ensure its continuity and its finalization into activities permeating through the plan. It is to be noted that, thanks to UN agencies, there are on-going activities within governmental departments, that are promoting sustainability in the different sectors, and enhancing the consideration of the environment in their activities.

(b) Another way to establish linkages is to involve the director of the Agenda project, or a senior officer from the concerned agency, in the work of the committee responsible for the development plans. There is a definite role for the General Corporation for Environmental Protection (GCEP), which needs to be promoted and strengthened. However, the present state of the affairs at GCEP at this stage, raises little hope for achieving substantial and fruitful involvement. Nevertheless, it will remain the one governmental agency which is basically responsible for environmental issues, and it should endeavor to activate many of the ideas in the Agenda in cooperation with other public and private partners.

III. LINKAGE WITH THE INDUSTRY

Industry is normally accused of depleting the natural resources and polluting the environment, while heaping profits. Industry on the other hand is part of development that the country needs. Therefore, the national agenda should seek linkages with the industrial sector, and should as well promote awareness and educational activities among industries, in a type of partnership to promote sustainability. Traditionally, industrial development, seen as a

cornerstone for prosperity and progress, often disregards environmental impacts. This leads to a conflict with communities and the industry resents governmental controls. However, this has to change, and the National Agenda should work towards this end.

NGOs are an important element of national efforts for protecting the environment

(a) One way to link with industry is to establish a liaison unit with the representative of industry, i.e the chamber(s) of industry. Also, it should be linked to institutions involved in industrial development. The National Agenda should conduct workshops and seminars to promote the comprehensive nature of sustainability, to dispel the fear and doubt about environmental impact assessment. The National Agenda should encourage the evolution of sustainable industries.

IV. LINKAGE WITH NGOs

NGOs are an important element of national efforts for protecting the environment. They have conducted awareness and educational activities on many environmental issues, thus, promoting understanding and encouraging participation by the general public. Some activities may focus on certain target groups. e.g. schoolchildren, while others address the lay man and the public, in a variety of messages using almost all available public media, and also through workshops, seminars, field demonstrations, utilizing many forms of educational material using the written and spoken word.

There has been quite a number of awareness campaigns and other activities along these lines. But what about the evaluation of these campaigns and their methodologies? Have any lessons been derived from the conducted activities? How effective were these activities, and how were they measured? These are legitimate questions and they point out the need for institutionalizing and for refining our methods and mechanisms?

The National Agenda should promote the national planning of awareness and educational activities.

Chapter Ten

Moving from the National Agenda to Local Agendas

INITIATING LOCAL AGENDAS IN JORDAN

I. INTRODUCTION:

As Jordan completes the definition of its national Agenda 21, through the participatory processes of the National Task Force, it is appropriate that we should consider our next steps, following the completion of the agenda. Developing

important next steps. The experience gained through the formulation of the National Agenda, combined with growing regional and global experience in the development of local agendas, will be of great value in these local agenda building processes. These local agendas will need to be carefully coordinated with the National Agenda.

Local agendas will help communities and other

enhance their understanding and awareness of their situations

the broad scope and strategy for the actions needed to move towards sustainable development, many of these actions will need to be carried out in very specific areas and situations. Local agendas will help com

their understanding and awareness of their situations of the sustainable development challenges facing them and of the options available for addressing these challenges. In this way, the development of these local agendas can help these communities and other groups to move towards achieving sustainable development at the local and sectoral levels. Local agendas can enhance the prospects for sustainable development in a wide range of issues and areas. A local agenda may be specific for a geographical location, such as a city, a watershed, a valley, a natural habitat, an archeological site, or may be for a specific sector, such as water, agriculture, industry or education.

Formulating local agendas can help communities and other groups to discover their potentials, develop their capabilities, and tap available resources to their maximum benefit. Local agendas are developed through participatory processes and many of the same tools are used in developing the National Agenda 21. Developing local agendas introduces communities and other groups to new approaches and skills, such as problem-solving techniques and communication skills and helps them come to terms with the complex environment and development challenges they face.

Local agendas should aim at building the capacities of communities or other interest groups and their institutions. Local agendas should include a strong element of awareness building in order to foster and orient subsequent actions designed to bring about lasting changes in attitudes and behavior.

Pilot local agendas can serve as

which can be applied when promoting and supporting the development of local agendas in other communities and sectors. One objective of these pilots should be the development of guidelines and training protocols for the preparation of local agendas adapted to Jordanian reality. These guidelines and manuals, which can draw on the wealth of material available internationally, will be instrumental in developing and extending the concepts and themes of sustainability to all cities, towns and villages of Jordan, and to all major socio-economic sectors.

II. AREAS OF CONCERN FOR LOCAL AGENDAS IN JORDAN:

Local agendas 21 could play a valuable role in defining sustainable development priorities, strategies and options in many different cases

towns and many villages, in distinctive regions or ecosystems such as the Jordan Valley and Gulf of Aqaba, and for key sectors such as water, agriculture and industry.

1. Sustainable Communities:

The cities and towns of Jordan had witnessed great changes due to population increase and movement and changes in

population continues to experience a high rate of natural increase. This combined with population movements into the country resulted in population growth estimated at 3.8 percent between 1979 and 1989. Population growth was further stimulated by an estimated 200,000 returnees from the Gulf countries in the early 1990s.

(Zarqa, Amman, Irbid and Balqa,) together

population, while the governorates of Karak,

10 percent of national population.

There has also been steady internal movement of population from villages and small towns into cities - mostly into the Amman Zarqa area by people seeking employment and better amenities. The urban population constituted about 78 percent of

about 39 percent of total population in the fifties.

The social values, attitudes and cohesion characteristic of traditional societies are slowly disappearing

2. The Cities of Jordan:

As a result of these population movements, some Jordanian cities have swollen beyond the carrying capacities of local land, water and energy resources. Rapidly growing demands exceed the capacities of already inadequate systems for water supply, wastewater disposal, sanitation services, and so on. Urbanization in these areas has also brought increased pressures on the social fabric of communities, and the health and well-being of their citizens.

The health profile of urban populations, for example, shows increases in road accidents, chronic ailments and other diseases, such as cardio-vascular disease and cancers, characterisic of urban industrials societies. The social values, attitudes and cohesion characteristic of traditional societies are slowly disappearing. New attitudes and behavior, characteristic of city life, are not always for the best. Urban poverty and slums have also become established features

The population of the Amman-Zarqa urban region alone constituted about 56 percent of

(1997). Encompassing more than half of the

its industries, the Amman-Zarqa region has

pollution. Much of the industry is concentrated in and around Zarqa.

3. Towns and Villages of Jordan:

Outside of the Amman-Zarqa urban area, Irbid is the only other city with a population over 100,000 inhabitants. The rest of

between smaller towns, mostly with populations from five to one hundred thousand, and villages with populations under five thousand.

Eight communities have populations ranging from fifty to one hundred thousand. Another seventeen towns have populations ranging from twenty to fifty thousand. Thirty have populations of ten to twenty thousand and fifty-six communities contain between five and ten thousand inhabitants. Finally, an estimated one million Jordanians live in almost a thousand villages and hamlets with populations of less than five thousand people.

4. Sustainable Regions:

El Ghor (Jordan Valley):

The Ghor area, or Jordan Valley basin, could benefit greatly from the definition of a regional sustainable development strategy which clearly identifies the sustainable development challenges, options and priorities of the region. The Ghor, including tributary streams on the eastern (Jordanian) slopes, has certain unique characteristics that determine its value. The population of the valley was estimated at 167,485 in 1997, distributed in small towns and villages. The region has a high economic output based on agriculture, fishing and related activities. It also has a good potential for religious and recreational tourism. Moreover the region is considered biologically important, as it encompasses many special habitats and biological communities, including important wetlands that maintain globally important biological diversity. The river lies, for example, on an important intercontinental migratory route for birds.

The Ghor has developed in the past few decades from a poor, malaria-endemic area to the present flourishing agricultural region. Following the eradication of malaria in the fifties, an irrigation canal was built to divert waters from the Yarmouk River (a tributary of the Jordan River) to provide irrigation water for the valley. The Jordan Valley Authority was established to oversee and direct all development activities in the valley. New agricultural methods and technologies introduced in the region have involved increased use of chemical fertilizers, pesticides and plastics (for greenhouses and mulching).

5. Sustainable Ecosystems:

Two Jordanian ecosystems in particular should be given priority for the development of local Agendas 21- the Dead Sea and the Gulf of Aqaba.

The case for starting with Zarqa City:

The best place to start with local sustainable development agendas in Jordan may well be in Zarqa. the second largest city in Jordan (has a population of 440,000). Located 30 Km. northeast of the capital city of Amman, Zarqa borders on the semi-dry areas of the Jordanian desert. It has developed from a town dependant on nearby army camps to a sprawling, crowded industrial city inhabited largely by industrial workers. Its population growth has surpassed that of any other Jordanian city. A congested city with a mostly poor population surrounded by industrial plants, the challenges facing Zarqa city are daunting: endangered groundwater supplies, polluted surface water resources (Seil Zarqa), air pollution, inadequate waste water and sanitation services, continued rapid urban growth and over-loaded, under-staffed, poorly equipped, poorly motivated systems for environmental management.

Zarqa is situated in the watershed area of seil Amman Zarqa which drains into King Talal Dam, the largest reservoir in the country. In addition, Zarqa lies on top of groundwater aquifers tapped for drinking water

Numerous efforts have been launched to combat the degrading situation in Zarqa - improved management of water supplies, expansion of sewerage systems, improvement in municipal solid waste management and so on and remarkable progress has been achieved. Yet the situation remains far from satisfactory. Pollution problems remain diverse and complex, while efforts to dealing with them are scattered and uncoordinated. Steadily mounting population pressures add to the social and economic demands and constraints on urban managers.

The Dead Sea:

The Dead Sea basin of Jordan is an ecozone of global importance. The shores of the Dead Sea and the oases in its vicinity preserve a blend of desert biota and bio-geographic relics. The adjacent Mujib basin has been identified as an important bird and wet land area for the Middle East. At the same time, the Dead Sea basin has important economic potential and development plans are already being implemented for the northern shores. The economic potential needs to be realized through proper management and conser
natural resources, especially its cultural and biological heritage.

The Gulf of Aqaba:

The Jordanian coastline of the Gulf of Aqaba extends about 26 kilometers along the northeastern shore of the gulf. The Gulf of Aqaba is of global importance as a unique ecosystem as well as being of great economic importance to Jordan. The city of

port city has developed over the years and more development of both industry and rism potential, is planned. Careful guidance will be needed to introduce the changes needed - by government, by businesses and by private citizens to ensure that these economic development plans will allow Aqaba to make the transition to sustainable forms of development.

6. Sustainable Sectors:

Water Sector:

Sectoral Agendas 21 can be useful tools for defining national priorities and strategies in key sectors. The water sector is a good example and perhaps the sector most in need of this kind of national agenda building process in Jordan.

Jordan is facing increasing water resource management problems. This problem has been brought into focus by the rapid growth of our population, industrial developments and agricultural practices. In the past, water pollution problems tended to be localized. But in recent years these problems have become serious national concerns.

Pollution control efforts in recent years have been aimed primarily at protecting water from local nuisance conditions. Constructions of water treatment facilities has been slow, with most industrial plants failing to install waste treatment works or to establish protection zones. Control efforts have also generally been weak, uncoordinated and lacking political support. Qualified personnel are scarce, legislation inadequate and officials and the general public insufficiently aware of the problems

and options available for solving them.

management problems have resulted from too little care in the past. Recent studies show an increased trend to water quality deterioration particularly in urban and agricultural settings. Increased mineralization has been indicated and chloride levels are often above permissible limit for drinking water. High bacteria counts reflect high levels of organic pollution in many of

A national sustainable development agenda

There is no one

way to carry out sustainable development planning

using many of the same sorts of participatory planning and monitoring techniques for local agendas, described in the following section

III. GUIDELINES FOR LOCAL AGENDA:

Development of guidelines and manuals that reflect Jordanian reality local concerns, constraints, opportunities and values will be an important part of promoting local agendas in Jordan. This work can draw upon the valuable experience of countries like Morocco (where an increasing body of resource material is available in Arabic) and Turkey. A programme recently launched in Morocco, for example, entitled

develops local public and private sector capacities for strategically analysing and planning, as well as carrying out concrete projects to improve environmental and socio-economic conditions in their own communities. Communities are helped to prepare, manage, monitor and evaluate their own projects. Financing is offered for a certain number of community-level pilot projects and communities are helped to gain better access to the financing necessary for carrying out other priority projects. Communities receive help to improve their decision-making processes, as well as a range of other training and information support at all stages of project planning and implementation, monitoring and evaluation. This identification and implementation of sustainable local level solutions to high priority environmental, economic and social problems helps fulfil a national commitment to improving the quality of life in Morocco.

Countries like Morocco and Turkey (and many others), have themselves drawn heavily on the expertise and guidance of organizations such as the International Council for Local Environmental Initiatives (ICLEI) and others who have emerge as valuable sources of information regarding localizing sustainable development. ide to planning local Agendas 21, for example, brings together elements of three different types of planning strategic planning, community-based planning and environmental planning. This guide can help

guidelines and manuals, tailored to meet the specific needs of Jordanian communities. Groups developing sustainable development agendas for a particular sector (such as water) or a target ecosystem or region (such as the Jordan Valley) could draw upon many of the same approaches and techniques. The following excerpts from the guide summarizes the approach they propose:

As a hybrid of these three planning traditions, sustainable planning makes use of the different planning methods and tools of each tradition in assisting communities to:

- equally integrate economic, community and environmental conditions into the design of development projects and service strategies;
- fully engage relevant interest groups and, in particular, service user s in the development of

services strategies that meet their needs; and

create service strategies that can be sustained because they focus on underlying systemic problems rather than problem symptoms, and because they consider long-term trends and constraints.

Bodies like ICLEI and many others around the world have found that there is no one

development planning. Each country needs to tailor its own processes, carefully adapted to their own situations. The following common elements have emerged, however, in most successful processes for developing local sustainable development strategies or - partnerships, community-based issue analysis, action planning, implementation with careful simultaneous monitoring and effective evaluation and feedback mechanisms. Again, the ICLEI guide provides a valuable overview of these elements, summarizing what they are, why they are important and

mainly of more detailed discussions of these issues, summarized here.

Partnerships:

Sustainable development planning engages residents, key institutional partners and interest groups, often know as

implementing action plans. Planning is carried out collectively among these groups. It is organized so as to represent the desires, values and ideals of the various stakeholders within the community, particularly local service users. There is remarkable variation in the types of stakeholders that different communities have involved in planning. In general, the creation of a dedicated structure -ordinate and oversee stakeholder involvement in planning is an important first step in any sustainable development planning effort. Typically, the first task of such a Stakeholder Group is to formulate a Community Vision which

expresses a local consensus about the fundamental preconditions for sustainability.

Sustainable development planning is a proactive process that allows the local government and its partners to support and engage the intellectual, physical and economic resources of residents to chart a course toward a desired future. (In: International Council for Local Environmental

Community-based issues analysis:

Involving local communities in the analysis of development and related service issues is essential to the optimal solution of problems. Municipal investments are more likely to succeed and win public support if they are responsive to the articulated needs, concerns and preferences of service users. Service strategies can also benefit from the knowledge and resources that local residents and institutions can themselves contribute to solving problems. At the same time, the process of issue analysis can be used to educate stakeholders about technical conditions and constraints for service delivery, such as ecosystem carrying capacities or financial constraints.

-based issues analysis typically involves two components. First, a process is established to gather and discuss the knowledge and wisdom of local residents about local conditions. Second, technical assessments are undertaken to provide stakeholders with further information that may not readily be available to them. Popular knowledge and technical research are then reviewed together by the stakeholders. With this information, they aim to establish a consensus about local problems.

-based issue analysis provides two additional benefits. First, the process can help the local community to establish priorities for action. As resources are very limited in most communities and not all problems can be effectively addressed at the same time. Priority-setting can be very important for the success of local action plans. The combined use of technical assessments and participatory issue analysis also permits the community to establish

progress and future changes in conditions can be measured.

Action planning:

Following the identification and analysis of priority service issues, partners can begin the process of creating Action Plans. The action planning process has three basic components:

Action Goals:

Monitoring is primarily useful for internal management purposes

Action goals are the specific aims that the community wishes to accomplish to achieve its vision for the future. They should translate the Community Vision into focused directives and resource allocation priorities. They are used to guide organizations, experts or professional staff to develop specific programmes, and in this way they serve as an intermediate step between a Community Vision statement and specific measurable targets for improvement of conditions related to sustainability.

Targets and Triggers:

After action goals are established, professional staff should work with stakeholders to define specific targets to be achieved within specified time frames. Planning efforts benefit greatly from the establishment of concrete targets. These targets permit managers to evaluate both the adequacy of actions being taken and the progress made in implementing an Action Plan. Triggers are unique forms of targets. They are agreed-upon future conditions that trigger further action by stakeholders when addressing a problem. For example, a community with air pollution problems may not be able to agree at present to establish restrictions on private automobile use, but they could agree that when local roadway use reaches a certain level they will institute a system of road pricing, such as toll collection.

An effective evaluation and feedback system provides regular information to both service providers and users about important changes in local conditions and progress towards targets; with this information, the actors can adjust their own actions and behavior. Evaluation information is used to guide planning and resource allocation (budgeting) processes so that these processes are kept accountable to the Community Vision and its action objectives. If an Action Plan fails to correct problems or to satisfy prioritized needs, the feedback system triggers further planning or action. (In: International Council for Local

Action Strategies and Commitments:

It is essential that an Action Plan specifies the action strategies and commitments of different stakeholders in order for them to work as partners in achieving the different objectives of an Action Plan. Action strategies and commitments should be very precise and contain specific projects, time schedules for implementation and commitments to allocate money, time and human resources.

Implementation and monitoring:

The implementation of partnership-based action plans requires adjustments in standard operating procedures and, oftentimes, some institutional re-organization. Pre-existing administrative procedures, divisions of responsibility among municipal departments, contract arrangements and other practices must be adjusted to allow for the active participation of service users and partner institutions in the implementation of an Action Plan. While the municipality institutes internal reforms to support partnership approaches, external projects and / or service partnerships must be formalized. Agreements that outline the responsibilities and investments of each partner are required, including specific work schedules and methods for ongoing monitoring of work. The Stakeholder Group or municipality may consider it necessary to establish a new organization or institution to co-ordinate the implementation of certain aspects of an Action Plan.

Monitoring begins during the implementation phase; not afterwards. Accurate documentation of both implementation activities and their impacts should be kept regularly, in order to allow for the evaluation of action strategies, service approaches, and their impact on local conditions. Such documentation is extremely valuable, and at times necessary, to identify the causes of problems that arise during the institution of new service approaches.

Evaluation and feedback:

Monitoring is primarily useful for internal management purposes. Evaluation and feedback are used for both internal and external purposes. It is necessary to maintain accountability among the stakeholder participants in the implementation of an Action Plan. Evaluation and feedback are also used to

inform the general public about progress in meeting specific targets, and to signal when the Action Plan must be altered in the face of change.

IV. PRE- REQUISITES:

A number of conditions would facilitate the application and help ensure the success of local or sectoral agendas. First the National Agenda 21 needs to be formally adopted by the government. A follow-up and monitoring unit for the National Agenda 21 should then be established in a key ministry

Ministry of Planning. This unit could also be supported by key stakeholders such as the General Corporation for Environment Protection (GCEP) and others. The unit should be able to carry out monitoring (discussed in chapter) and follow-up activities, provide guidance and advisory functions to the local or sectoral agendas and serve as a link between the National and the local or sectoral agendas. A final important condition is that international agencies on the one hand, and national government agencies on the other hand,

move towards more sustainable development.

Chapter Eleven

Monitoring and Reporting on Implementation

I. INTRODUCTION

A. WHY MONITOR THE IMPLEMENTATION OF

There is sometimes an inclination, when monitoring the implementation of a broad

21, to focus mainly on the level of resources available and disbursed, rather than focusing on the results and longer term effects being achieved with these resources. Yet it is precisely this focus on longer-term results and effects that will be needed when

Agenda 21.

What are the main reasons for monitoring

in the coming years?

Longer-term results and effects will be needed when monitoring the implement-ation of

Agenda 21.

To measure and report to the country on progress being achieved at the national, at local levels and by the key sectors in the country towards the goals established in the national agenda. National stakeholders will expect reliable, objective r
A21 and the results being achieved. Monitoring reports will be an important means of informing and maintaining the confidence of national stakeholders. A national Agenda 21 office should aim to provide an annual

To indicate specific programmes, sectors, communities, regions and so on, where notable progress towards more sustainable development is being achieved and how this is being done; and to signal where progress is not being achieved and why not.

To build upon and strengthen the participatory processes used in developing the national agenda (and later local Agendas 21), by involving a wide range of stakeholders in monitoring and reporting on its implementation.

To ensure efficient learning from experience, by paying careful attention to the lessons emerging in different communities, geographic regions and sectors, and ensuring these are effectively shared with other interested parties in the country. These reports should be used transparently as learning and quality control tools for the programmes at all levels. This is a good way to demonstrate the

learning from experience and improving over time.

To share and compare J with the regional and global community.

B. WHAT KIND OF MONITORING AND REPORTING ARE NEEDED?:

There is no blueprint for monitoring the implementation of a national Agenda 21. The approach to

tailor-
unique character, opportunities, needs and constraints of Jordan, its Agenda 21 and the priority concerns of its stakeholders.

In any case, reports on this monitoring should be:

regular and timely,
credible and objective,
concise and easily understood by a broad national audience, and
widely disseminated among national stakeholders.

The monitoring itself should extensively involve national stakeholders in gathering, compiling and analyzing relevant information, much of which will be available

monitoring and reporting on their activities and sectors.

The monitoring process will inevitably also require specific information gathering to fill in gaps. This can be done by both stakeholders and by a national Agenda 21 office. A range of different types of information should be sought to provide as accurate a

Monitoring on

Agenda 21 experience needs to generate consistently high quality information

progress towards sustainable development. More subjective instruments such as case studies and interviews / questionnaires should be combined with systematic monitoring of key indicators to provide a balanced picture of the evolving situation.

C. HOW TO DO THIS MONITORING AND REPORTING?

To be effective, the monitoring and reporting on the implemen
Agenda 21 will need to respect this

stakeholders and Agenda 21 officers who will be taking the lead in implementing this monitoring. The monitoring approaches should be as simple as possible, both to understand and to carry out. The system developed to report on this monitoring will need to avoid being too standardized or too complicated, and avoid putting unrealistic demands on those responsible for the monitoring and reporting. Avoiding systems which are too demanding, too complicated or too standardized will go a long ways towards ensuring that first, the monitoring and reporting will actually be done and second, people will read the reports.

Avoid systems that are too demanding, too complicated or too standardized

I. Monitoring:

Agenda 21 should involve three types of information gathering:

1. Gathering information readily available, from national stakeholders:

The national Agenda 21 office should be able to obtain a certain amount of monitoring information from regular reports and studies of national partners such as government agencies (and their major projects and programmes), universities, regional and municipal governments, NGOs and private firms.

2. Gathering of necessary supplementary information by national stakeholders:

Different stakeholders from the public and private sectors and NGOs can be asked to take responsibility for specific dimensions of the monitoring. For example, public and private organizations and NGOs may agree to each monitor one key indicator of results in their areas of interest (e.g., water resource management, poverty reduction, industry, agriculture, urban management, energy management).

3. Gathering of necessary supplementary primary information by a national Agenda 21 office:

Each year the national Agenda 21 office will probably have to gather a certain amount of supplementary information to complete an annual report on the implementation of

Agenda 21 office may wish to contract national specialists to carry out a series of short term monitoring assignments, such as interviews and / or questionnaires to measure changes in attitudes and knowledge about sustainable development issues among different groups of Jordanians, case studies to assess the effectiveness of different types of economic instruments being used to promote more sustainable behavior among Jordanians.

II. Reporting:

The national Agenda 21 office will necessarily take the lead in reporting on the

The office may opt, for example, to issue an

national office should draw on the comparative advantages of different national stakeholders. For example, national communication specialists may be contracted to prepare short videos documenting the development and implementation of the national Agenda 21 and describing to a Jordanian audience the different problems solved and lessons learned. Local or national television networks could be asked to air these video

to the national Agenda 21 (these videos will also be good local programming).

Indicators are useful monitoring tools

1. Encourage learning from mistakes

It will be important for the national monitoring system to encourage all national stakeholders to learn from mistakes, theirs and others. The overall value of monitoring and reporting on the implementation of

considerable extent on the ability of the national Agenda 21 office to help national stakeholders recognize the inevitability of mistakes, and the value of these mistakes as learning experiences. There is obviously no simple formula for this kind of encouragement. The national Agenda 21 office will have to address the issue in ways best suited to each case.

2. Monitoring systems should also be rigorous

experience needs to generate consistently high quality information. The Agenda 21 office should reach clear agreement with national stakeholders as early as possible, on answers to the following questions:

3. What type of information will be generated by monitoring?

The national Agenda 21 office needs to clearly define what type of information is needed to properly monitor the Agenda 21. This will involve assessing what types of monitoring are required to track progress on issues, and what types of information are of greatest interest and value to national stakeholders.

4. How will this information be generated, and by whom?

The national Agenda 21 office will need to clearly indicate how different types of monitoring information will be obtained, analyzed, and summarized (and who will do it).

a. If indicators will be monitored, then which ones or how they will be selected?

Indicators can be useful monitoring tools. The use of indicators to monitor the progress of national sustainable development strategies is discussed below. A monitoring plan developed by the national Agenda 21 office should identify which indicators will be used.

Indicators should be selected to cover the range of environmental and socio-economic concerns covered in

as:

the number of public sector organizations introducing economic instruments - pollution fines, tax breaks for investments in water and energy efficient technologies and for investments in pollution prevention - to improve environmental management (this indicator could possibly be monitored by the Ministry of Planning or the Ministry of Finance),

levels of success in creating new employment opportunities through improved environmental management, in different sectors, municipalities and regions of Jordan.

evidence of increased private sector investment in environmental management services and infrastructure (the national banking system might be able to provide reliable data for this kind of indicator),

the number of community plans for sustainable water resource management which are in place and achieving positive results,

the number of local government agencies having technical and professional staff with well defined environmental management responsibilities and the necessary budget to carry out these responsibilities, and

the level of satisfaction with performance of sustainable

members of groups or communities

might best monitored with a series of interviews over time).

b. If baseline data will be required, then how will they be gathered?

Reliable baseline data are likely to be required for monitoring and reporting on the implementation of

development strategy. This will be particularly true where indicators will be used, but also for other types of monitoring such as audio-visual documentation, participant observation, case studies, public meetings, sample surveys, and reports by participants and managers. Baseline data requirements and plans for meeting these requirements, should be described in the national

monitoring.

5. How will monitoring information be used by the national programme?

The national Agenda 21 office will need to commit itself not just to generating regular monitoring reports, but also to ensuring that these reports are broadly distributed among national stakeholders and that the reports provide information which is interesting and useful for these stakeholders.

6. Who will carry out monitoring and reporting and what will their roles be?

A broad range of stakeholders will need to work with the national office to ensure the effective monitoring of

This issue is discussed in greater detail in section D below.

7. What is the timetable for monitoring reports?

The national Agenda 21 office will need to establish a clear timetable for reporting on the monitoring of

21.

III. Developing and Utilizing Indicators of Sustainability.

1. How can indicators improve effectiveness of

progress in implementing its Agenda 21. Indicators should be used to complement, not replace, more qualitative assessments of results and effects such as case studies and interviews of participants. Indicators used alone often present only a very partial picture, particularly if one is

aiming to document the sorts of

Agenda 21. Used carefully, indicators can be very valuable for validating, supporting and supplementing more qualitative observations. Indicators are often numeric, yet they may also be simple

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-government and private sector representatives active \ not active and influential \ not influential on national policy development

\

not introduced to reflect the true

2. Definition and role of indicators

Indicators

system. They help us gauge in which direction a particular system is moving. Indicators are often used to highlight trends and detect changing conditions in some element of the economic, social or environmental system(s). Typically, indicators are developed to monitor systemic changes resulting from policy decisions, or to monitor progress in meeting performance objectives in a place or sector. To be useful, indicators need to be measured consistently over time and space.

Agenda 21 may be classified environmental, economic or social.

From a sustainable development perspective, some of the most interesting indicators are those which measure integrated progress in more than one of these areas, such as

1. Job creation by different sectors associated with improved environmental management and leading to decreased poverty levels.
2. Increased efficiencies in the use of resources such as water or energy by different sectors, leading to both economic and environmental benefits.

The goal of monitoring the national agenda in Jordan will be to measure changes induced by the efforts of different national stakeholders and programmes. This sort of induced change can be difficult to distinguish from a normal range of variation. Monitoring of indicators should start from the earliest stages of

21 and continue long enough to help observers distinguish natural variability from the actual results and effects of their programmes.

Start with a few simple indicators

Appropriate indicators for monitoring results and effects of

should be selected by national stakeholders in collaboration with the national Agenda 21 office. When using indicators, national stakeholders and the Agenda 21 office will need to reconcile conflicting imperatives. On the one hand, it will be desirable to have all important environmental, economic and social results and effects of the national Agenda 21 captured by monitoring. On the other hand, there are two reasons to start by monitoring only a few key simple indicators:

resources available for monitoring are likely to be limited; and

monitoring reports, if they are to be widely read by national stakeholders (and the international community) should be concise and uncomplicated.

How to select indicators?

Many criteria for indicator selection have been proposed in recent years (e.g., availability, causality, comparability, correlation value, spatial detection, temporality, validity, visibility, and so on). National Capacity 21 programmes should adopt an approach to selecting indicators that can be easily explained to and implemented by national stakeholders. The most important criteria for selecting indicators of the results and effects of Capacity 21 programmes are probably:

- level of national participant interest in the indicator,
- relevance of the indicator to the
- comparability of the data with those of other communities, sectors, etc.,
- reliability of the data / data source,
- relative ease of access to the data, and
- ability of indicator data to convey clear meaning to a broad audience within the country and, if possible, among the international community.

Environmental indicators:

Examples of environmental indicators include various chemical and biological parameters measuring water quality (for potable water, for agriculture, for bathing and so on), land area devoted to forests and rangelands and various parameters measuring the quality of these lands and their biomass, diversity of species and genetic -

waste, percentage of citizens receiving some form of environmental education or training, etc.

Economic indicators:

Some examples of economic indicators are per capita income and annual rate of growth of per capita income, unemployment rates, per capita area of land

The national Agenda 21 office and national stakeholders together will need to consider their information needs and how these can best be met. For example, while accessibility to data is an important criterion, implementation should not simply be tailored to suit available data or technical skills. Data routinely collected by government departments for instance or private sector organizations, may or may not be a cost - effective source of Capacity 21 monitoring data, depending on their adequacy, relevance, clarity and reliability.

Most of the time, effective use of indicators (and many other kinds of monitoring instruments) will require proper baseline information. The national Agenda 21 office should ensure these baseline data are assembled promptly once indicators have been chosen.

D. WHO SHOULD BE INVOLVED IN THIS MONITORING AND REPORTING?

A nat
Agenda 21 will have a key role to

play in ensuring effective monitoring of the implementation of the

Agenda 21 office, in collaboration with principal stakeholders, should also clearly identify the monitoring roles of each of the principal partners to be involved in the monitoring of

government agencies, private sector organizations, NGOs and the Agenda 21 office itself. It will be especially important to ensure national stakeholders are fully involved in the planning and implementation of the

participation will help reinforce their ongoing participation in the national dialogue on sustainable development.

The national Agenda 21 office will need to establish focal points in all major stakeholder organizations. These focal points will in turn be instrumental in ensuring that their organizations will contribute effectively to monitoring the implementation of the national Agenda 21.

The national Agenda 21 office should also make use of other national experts to support this monitoring by others when necessary. For example, a national consultant can assist private sector, NGO, and public sector stakeholders in the programme who are preparing case studies or other reports to describe their participation in

Where necessary, national consultant experts can also assist some groups to assemble other types of available, relevant information, such as indicator data, into coherent reports. The Agenda 21 office may find they need to hire a local specialist for a certain period each year to help collect, collate, analyze and synthesize the information of various types made available by various stakeholders over the year.

Annex 1

National Environmental Impact Assessment For Jordan

PART I: INSTITUTIONAL & ADMINISTRATION REQUIREMENTS

In the year 1992, and following the world summit on environment and sustainable development in Rio de Janero, the Government of the Hashemite Kingdom of Jordan signed the Agenda-21.

The Agenda-21 sets out the major policy recommendation instrumental to global environmental protection and sustainable development.

The adherence of Jordan to the objectives and aims of this Agenda-21 determines since, the national policy and strategies for the protection of the environment within the Kingdom and sustainable development in order to guarantee economic and social progress and secure worthy quality of life for all future generations in Jordan.

The environment protection law No.12 for the year 1995 provides definition, frame and dimension to this new environmental and social policy.

According to article # 15 of the environmental protection law GCEP is entitled with the implementation of E.I.A system within Jordan.

In order to ensure efficient application of EIA, GCEP has to set up the appropriate institutional requirements needed to be in place for an effective (E.I.A) system.

Ideally, an EIA management system would include elements from combination of successful systems. Documentations for such systems have been checked out by the committee which is responsible for setting up an EIA system for Jordan including those systems for U.S,Canadian, Germans and others.

The common factors among these operable systems include the following:

Responsibility for EIA review rests with one agency in a given region.

The responsible agency is set up in such away as to facilitate the entire EIA process, from submission of project back grounds to final approval of EIAs.

The organizational structure must necessarily be able to coordinate with relevant private and public sector agencies in all its operations.

The organization must follow the exact laws and procedures and conduct all work in a transparent manner.

Based upon the experiences of successful organizations and taking into account the above mentioned factors, an ideal situation for an organization like the GCEP would include a senior manager (within a known management system) and researchers and administrators.

These would be the minimum numbers of levels required to ideally manage a successful project.

The senior manager or the director of the environmental impact assessment directorate.

This individual would have the primary responsibility for work progress and development and be in a position to make decisions regarding any EIA process for any project. The EIA director is

responsible for the overall management of the department in terms of personnel and resource administration. The director facilitates and handles all requests for project EIAs.

The director will be the lead reviewer of all EIAs submitted to the General Corporation for [illegible] P[illegible] will [illegible]horit[illegible] [illegible]ersons [illegible]eviev[illegible]

EIA Development Division

EIA Operations Division

EIA Review Division

Initiation Consultation

Scoping Monitoring

Ad Hoc Committee

PROJECT COORDINATORS:

These individuals would be involved in directing separate divisions within the EIA system, from EIA development and EIA operations to EIA review.

These individuals will have a basic engineering background with some background on environmental management.

ENVIRONMENTAL RESEARCHERS:

These individuals would be involved in day-to-day operations for projects, either as part of a review team to facilitate the work or part of operations to monitor scoping session.

These individuals could also be a part of the review department where actual analysis, review and monitoring activities are required.

These individuals would be junior researchers with backgrounds in engineering, environmental social research, and related disciples.

Given the personnel requirements above, an ideal situation for organizational system for EIA management could be seen as follow:

EIA Directorate
(EIA director)

The function of these divisions are outlined in terms of function and scope of work as follow:

EIA DEVELOPMENT:

It is the division responsible for facilitating and handling requests for

around the initiation process and initial consultation along with legal affairs. Thus public relations are essential in this division.

THE EIA OPERATIONS DIVISION:

Is responsible for ensuring scoping session are adequately conducted.
In a situation where not much development work exists, this division could be easily attached to the EIA development division.

EIA REVIEW:

Involves reviewing the technical

would necessarily involve

experienced individuals who have no conflicts of interest of any kind.

The EIA review committee would include personnel from GCEP and from other governments departments as well as from the private sector, if necessary.

The disciplines required for each Environmental Impact Assessment will vary with the general features of the projects, therefore this committee will be an ad-hoc committee established for each Environmental Impact Assessment.

This ad-hoc committee is headed by the EIA Director and deputized by the head of the EIA review division.

In order for the General Corporation of Environment Protection to carry out its responsibilities and duties concerning Environmental Impact Assessment in an efficient way it has first of all to start building up the capacity of its own staff, secondly it has to bear the responsibility of raising the awareness of the different parties involved in the EIA process.

PART II : **A Guide to the EIA Process.**

PROCEDURE FOR EIA

LEVEL 1

I. INITIAL FILING

The Proponent applies to the General Corporation for Environment Protection (GCEP) of his/her intention to undertake a development project using the application form, Project Information Form (PIF), shown in Annex (1.1).

The PIF instructs the Proponent on the information required by GCEP, for due consideration and decision.

The required information includes the following:

General information on the location of the planned project supported by a site map.

A brief description of the planned project, purpose and nature, capacity, major components and facilities, and future expansion plans.

Expected water, energy, lands and labor requirements.
Expected emissions into the environment and proposed control and treatment methods.
Implementation schedule for the proposed projects at different phases (planning, construction, operation, etc.)

The PIF forms are available at GCEP.

GCEP, upon receipt of the PIF, evaluates the data submitted by the Proponent and consults the Inclusion List, included in Annex (2), to determine whether or not the proposed development project is subject to formal Environmental Impact Assessment (EIA) procedure

GCEP files its decision and notifies the Proponent in writing, within two weeks of the time the PIF is received, giving clear and precise reasons. The statement of decision and the PIF are then made available for public information by posting on the public notice board at GCEP for two weeks.

Where the decision indicates that EIA is not required for the proposed development project, the Proponent may seek approval immediately from the appropriate regulatory authorities and proceeds with normal licensing application and procedures, as this decision does not replace or override the normal requirements for permits or licenses.

Where GCEP rules that EIA is required for the proposed development project, the Proponent proceeds with the implementation of EIA.

II. DIRECTIVES AND ISSUES SCOPING

GCEP provides the Proponent with sector-specific Directives to assist the Proponent in identifying issues to be covered in the EIA (i.e. SCOPING).

The Directives constitute a legal binding guidance to the Proponent, containing the minimum requirements for the elaboration of EIA and the Environmental Impact Statement (EIS).

The Directives are sector-specific and may provide in most cases, supplement information and instructions related to various sub-sectors.

The aims of the Directives are:

To inform the Proponent of the most suitable approach to arrive at the information and data required by GCEP.
To provide the Proponent with general explanation and instructions for the implementation of EIA and preparation of EIS.
To indicate sector-specific issues, emphasizing on the most important impacts on the environment and sustainable development.
To facilitate the elaboration of specific Terms of Reference (TOR) for EIA to be drafted by the Proponent.
To ascertain pertinent and complete EIA.

The Proponent shall, when required, recur to public participation when setting up the Terms of Reference (TOR) and working plan for EIA and EIS, as part of the scoping process. Annex (3) contains explanatory notes on scoping and TOR.

GCEP disposes of the capacity to:

Provide technical advice in cases of persisting queries.
Draw, together with the Proponent, procedural guidelines for scoping, if needed.
Advise the Proponent on the level of public participation, if Needed.

III. TERMS OF REFERENCE

GCEP reviews the proposed TOR submitted by the Proponent, modifies, and approves final TOR.

LEVEL 2

I. EIA AND EIS

The Proponent, upon approval of the TOR by GCEP, proceeds with conducting EIA for the proposed project. The Proponent shall seek technical support from qualified, independent specialists approved by GCEP.

The benefits of EIA are:

GCEP obtains clear and comprehensive information about the proposed project, its potential negative impacts, significance of the impacts, and the firm intention of the Proponent to reduce the adverse impacts to a level compatible with the imperatives for the protection of the environment, to ensure justifiable evaluation and decision.

The Proponent obtains detailed information about the sustainability of his/her proposed project, adjust initial plans, and incorporate appropriate mitigation measures as an integral part of his/her project.

The EIS must include, but not limited to, the following main sections:

Executive summary
Introduction
Project description
Issues scoping
EIA methodology
Assessing potential impacts
Conclusion
Mitigation plan
Environmental management plan
Appendices

Annex (1.4) provides detailed description and list of contents of EIS.

Once the EIS is completed, the Proponent submits (4) signed copies to GCEP.

The Proponent is held responsible to satisfy the requirements of GCEP in order to assist proper evaluation.

II. TECHNICAL EVALUATION

Upon receipt of the EIA and EIS and due registration, GCEP undertakes technical appraisal of the EIS to assess the following:

The quality and pertinence of the submitted material.
The scientific value and plausibility of the applied methods and approaches, information and research results.
The compatibility of the impacts with the bearing capacity of the environment.

assisted by specialists from the various relevant Ministries, undertakes the evaluation of the entire EIA and EIS. GCEP can seek specialized technical help, if needed, from research institutes and universities.

GCEP sets up the above mentioned inter-Ministerial, inter-Departmental Technical Evaluation Committee and coordinates its activities to ensure proper participation and comprehensive inter-disciplinary evaluation.

is composed of three distinct steps, as follows:

STEP 1

Evaluation of the general conformity and consistency of the submitted EIS with the requirements of the Directives, TOR and other legal references.

Where the EIA and EIS do not conform to the legal requirements, and/or the sector-specific Directives and/or the TOR, GCEP informs the Proponent, in writing, within two weeks of having received the EIA and EIS. GCEP requests from the Proponent to incorporate the

necessary adjustments, additional information and data, scientific clarification and re-submittal.

STEP 2

Evaluation of the credibility of the EIA, particularly, the appropriateness of the methodology and approach of the entire EIA, the scientific validity of the study, the scientific/professional quality of supporting resources such as licensed laboratories, simulation techniques etc. , and the legal value of the various evidences.

STEP 3

Evaluation of the compatibility of the residual impacts with the protection of the environment and sustainable development in Jordan, referring to existing standards and norms, limits and threshold values, and confirmed scientific references.

The Technical Directorate at GCEP is responsible to complete the evaluation process within thirty days of having received and registered the EIA and EIS for a proposed project. This time-line applies for complete submittals only. Time required by the Proponent to complete and provide additional requested data, is at the Proposed projects of major importance and significant inter-sectoral impacts are exempted from this time-line.

Upon completion of the evaluation, the Technical Directorate informs the Director General (DG)/GCEP about the findings and conclusion, and justifies this conclusion.

The technical report prepared by the Technical Directorate and submitted to the DG/GCEP provides confirmed facts and data to the decision-maker, and gives executive information concerning the conditions and particular observations related to the proposed project.

III. DECISION AND APPROVAL

The DG/GCEP reviews the technical report and makes his/her decision on whether or not the proposed development project can proceed. The decision is announced on the public notice board at GCEP for two weeks.

The decision of GCEP is notified to the Proponent in writing within forty-five days of having received the EIA and EIS from the Proponent.

Upon expiry of this period, and in cases where no decision of GCEP has been filed, the EIA and the connected EIS are considered as approved without further conditions.

In any case of evident persistence of significant residual impact on the environment and sustainability of the socio-economic development, the DG/GCEP may reject the application and proscribe the implementation of such project.

Where the DG/GCEP rejects the application for a proposed project, the Proponent has the legal right to appeal to the Environment Protection Council. The appeal must be filed within 15 days from the date of issuing the decision. The council studies and evaluates the case and its decision is considered final.

The approval of the EIA and EIS is a legal prerequisite for further licensing from other relevant governmental agencies. Any

application for permits or licenses is

approval or exemption is attached to the application.

the EIS submitted by the Proponent becomes legally binding. GCEP has legal power to ensure and enforce compliance with the EIS, during the various stages of the project.

In case of persisting non-compliance, GCEP applies the legal consequences determined by Law No. 12/95 for the Protection of the Environment.

LEVEL 3

I. ENVIRONMENTAL MANAGEMENT PLAN

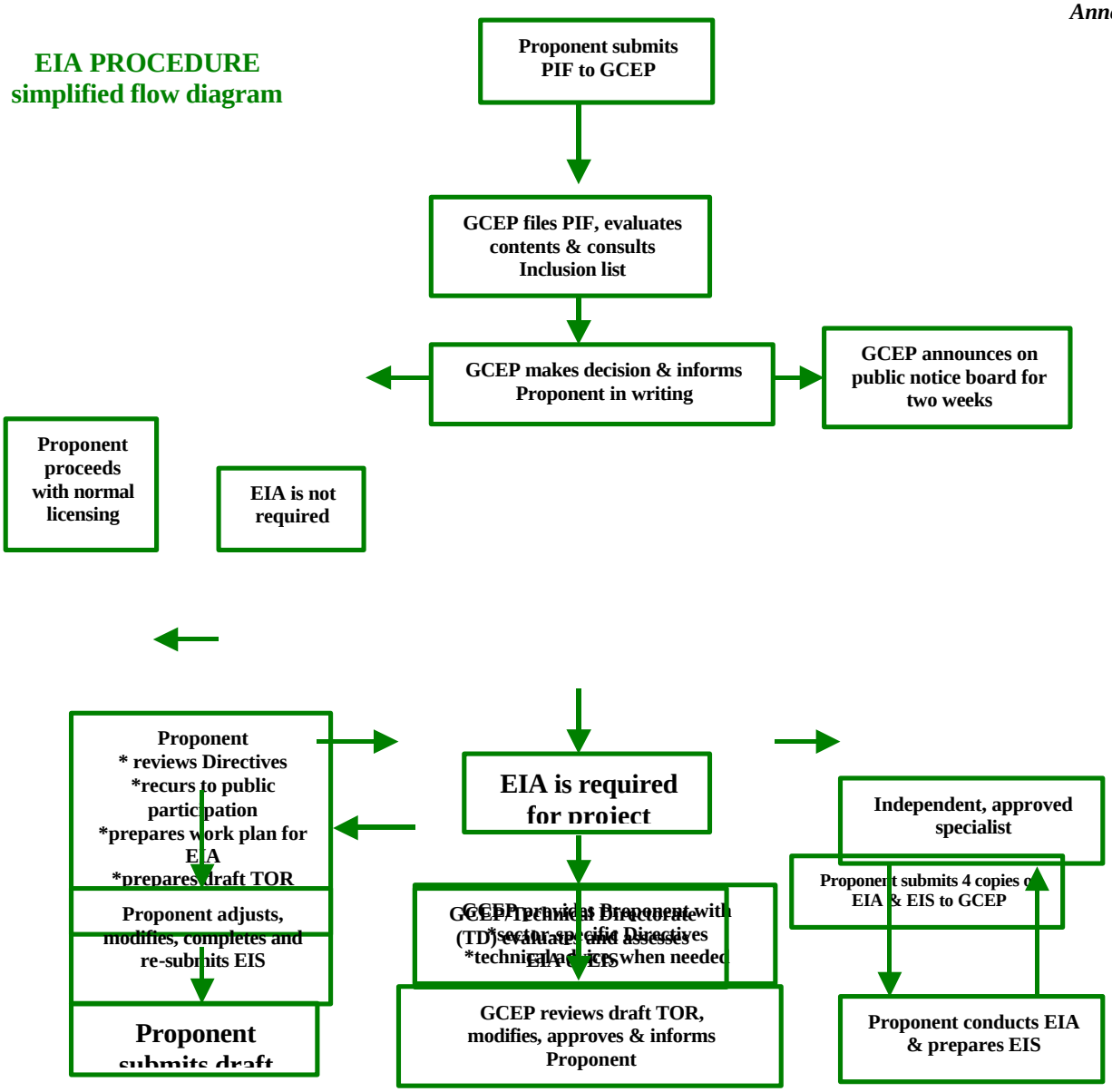
The approval of an EIA and EIS is linked to conditions for follow-up of the activity during its different phases. The purpose of the follow-up is to ensure that the project does not exceed the environmental impacts predicted in the EIA.

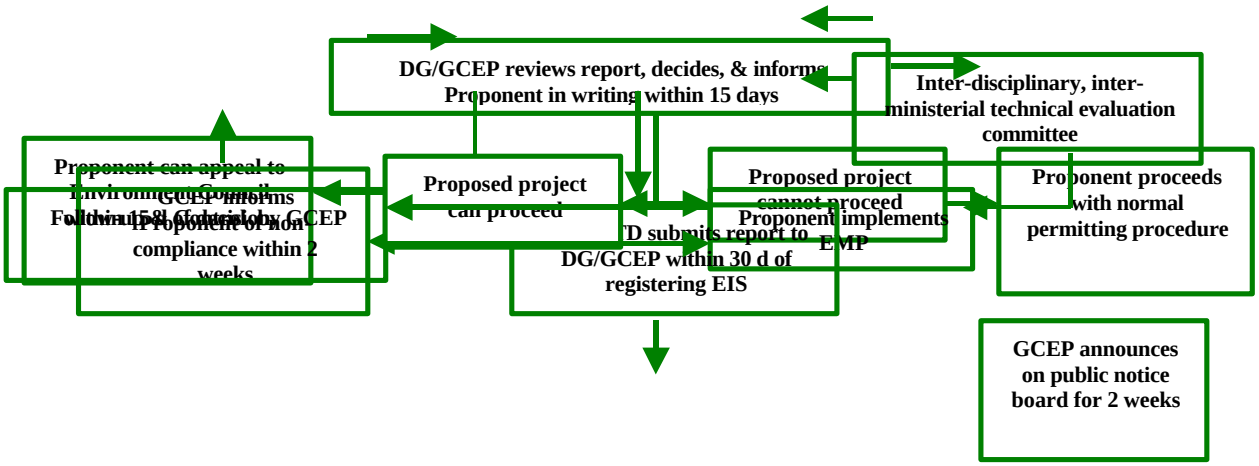
The Proponent is responsible for implementing the Environmental Management Plan (EMP), included in the EIS and approved by GCEP. Thus, the Proponent shall undertake the necessary monitoring (compliance, effectiveness, and impact monitoring) and submit the results periodically to GCEP, as mentioned in the EMP.

GCEP receives files and evaluates such submittals. In any case of non-compliance with the requirements as set forth in the EIS and EMP, GCEP informs the Proponent in writing giving clear instructions on the required measures to be taken by the Proponent to rectify the situation.

GCEP, as empowered by Law No. 12/95, implements any monitoring, inspection, and follow-up activities on its own initiative and in coordination with other concerned authorities.

EIA PROCEDURE
simplified flow diagram





ANNEX 1.1

PROJECT INFORMATION FORM (PIF) FILE NO.------

Instructions:

* *This form should be completed by the Proponent for all development projects prior to licensing.*

**** The purpose is to determine whether or not the proposed development project is exempted from Registration for Environmental Impact Assessment (EIA) under the JEIAA No. (----) for the year -------.***

I. General Information

Project Title: ----------

Location: (attach site map)----------

Name of Proponent: ----------

Address: ----------

Tel. No: ----------

Fax No: ----------

E-mail: ----------

II. Project Description

Purpose: ----------

Nature: ----------

Capacity/unit: ----------

Components: ----------

Facilities: ----------

Implementation Schedule: ----------

Expected Expansion: ----------

III. a. Sector:

*** Industrial *Agriculture * Tourism & Recreation**
*** Energy *Commercial * Housing**
*** Mining * Transportation * Water & Sanitation**
*** Waste Disposal**
*** Other (specify)----------**

b. Sub-sector: ----------

IV. *Water Requirement*

Source: * Municipal * On-site Private Well * Tanker * Other

Expected Consumption (m3/d) ----------

V. Energy Requirement

Source: * National Grid * Electricity Generator

Expected Consumption: * Fuel Oil ---------- * Diesel ----------

VI. Land Requirement:

Area: ----------

VII. Labor Requirement:

No. of Workers: * Skilled----------
*** Unskilled----------**

VIII. Expected Emissions and Wastes

a. Waste Water

Quantity (m3/d) : ----------

Treatment/Reuse/Disposal: ----------

b. Solid Waste:

Quantity (kg/d) : ----------

Treatment/Recycling/Disposal:----------
---

c. Air Emissions:

Pollutants: ----------

Control Methods:----------

This section is for official use only

DECISION :

(A) Project is exempted from EIA under JEIAA No. ( ) of the year ---- Proponent proceeds to normal licensing and permitting.

(B) Project is not exempted from EIA under JEIAA No. ( ) of the year --- Proponent should register for EIA at GCEP/EIAD.

Recommended by: **Approved by :**

Name: ----------Name:----------
Title: ---------- Title: ----------
Date:---------- Date :----------
Signature: ---------- Signature: ----------

ANNEX 1. 2

List of activities subject to EIA Procedure and approval prior to any other licensing by public authorities Concerned, and implementation.

Any industrial activity generating solid, liquid or gaseous emanation of dangerous, unsanitary or annoying nature and likely to generate significant negative impact on natural and human environment.

ENERGY PRODUCTION

- Thermal power plants and any other combustion operated power generation (> 300 MW);
- Installation for industrial production of electric energy, steam or hot water;
- Installation for the transport of gas, steam, hot water and electric energy in overhead lines;
- Hydrocarbon and fossil gas industry: prospecting, production, transport
- Hydrocarbon refineries and gasification and liquefaction plants of > 500 t/day of carbon fuel or bituminous schist.
- Fossil gas storage units
- Open air natural gas storage units
- Underground storage tanks for gas
- Gas and oil pipelines.
- Industrial carbonising plants
- Hydro-electric power plants

CHEMICAL & PHARMACEUTUCAL INDUSTRY

- Chemical industries
- Pharmaceutical industries
- Storage installation for petro-chemical and chemical products
- Production of artificial mineral fibres,
- Production, processing and filling of explosives and powder.
- Glass industry
- Phosphate industry

METALLURY & METAL WORKS

- Metallurgy, ferrous and other metal.
- Foundries and metal melting and casting works
- Metal works
- Boiler and container production industry, plumbing industry
- Surfacing and galvanising industry
- Cutting and sawing units
- Shipyards
- Aeroplane construction and/or maintenance
- Railway construction
- Car and motor assembling industry
- Scrap iron and junk yards.

MINING & QUARRYING

- Mining, quarries and open air mining.
- Underground prospecting by explosives
- Drilling and deep well construction, with the exception of soil and sub-soil quality test drilling and particularly:

- Geothermal wells
- wells for waste storage and deposit
- water production wells
- mineral production wells and pits
- coal production wells (dry distillation of coal):

- Cement and calcareous material production plants
- Asbestos cement production.

TEXTILE, PAPER, LEATHER, TIMBER PRODUCTION &

PROCESSING INDUSTRY

- Textile and dyeing industry,
- Industrial washing, cleaning and bleaching of woollen and other textile material
- Fibre dyeing industries;
- Paper, cardboard and cellulose processing and production.
- Tanneries, hides and skins industry.
- Timber processing industries;
- Fabrication of laminated and chip-board panels of fibre, sawdust, wooden chips and/or assimilated material
- Cutting and saw mills.
- Production and processing of elastomers

FOOD PRODUCTION & PROCESSING INDUSTRY

- Food production and food processing
- Fat and oil production and processing industry
- Sugar production, molasses and syrup industry;
- Diary plants
- Flour-milling and semolina production;
- Breweries and bottling plants
- Slaughter houses
- Food canning industry
- Fishery products processing and canning industry

RURAL DEVELOPMENT & AGRICULTURE

- Rural land consolidation and reallocation.
- Reforestation of > 100 ha.
- Clearance operations, and barren land or semi-natural land reconversion , for intensive agriculture, of > 50 ha;
- Rural irrigation schemes and works;
- Polder works and polder agriculture;
- Poultry farming;
- Pig farming;
- Aqua-culture and fish farming

INDUSTRY PARKS DEVELOPMENT AND IMPLEMENTATION

MAJOR URBAN DEVELOPMENT WORKS

TOURISM DEVELOPMENT, INFRASTRUCTURE AND IMPROVEMENTS

- Tourism facilities and centres, in particular activities situated in: mountains, coastal environments, forests, rural environments, national parks and other protected areas, situations in vicinity of cultural values and socially singular conditions;
- Tourism hotels > 250 beds.

INFRASTRUCTURE WORKS

- Roads, railways, airports
- Ports and harbours.
- Urban railway, in surface, overhead or underground ;position

- Dams and barrages, and other type of major water retention and water storage works.
- Water transfer schemes and works.
- River and waterways improvements, and connected works.
- Coastal civil works
- Sewage collection and disposal systems.

- Waste water treatment plants, and water conditioning plants.
- Installations for disposal, treatment and elimination of solid waste of any type and nature, and of any type of technical or biological processing

ANNEX 1. 3

SCOPING & TERMS OF REFERENCE

SCOPING

Scoping is an important early step in EIA. It identifies the important issues that should be considered in the assessment and eliminate those that are not important. Thus ensure that time and money are not wasted on unnecessary investigations.
Scoping should aim at focusing the EIA on key components of the environment (or valued environmental components VECs), and on alternatives and issues of greatest concern.

Scoping is a process that result in identifying:

- The appropriate extent of EIA.
- The important issues and concerns.
- The information necessary for decision making.
- The significant effects and factors to be considered.

Scoping requires consultation with all stakeholders (public including NGOs, governmental / regulatory authorities, and the developer).
Different techniques are used for such consultation such as:

- Telephone calls.
- Meetings.
- Workshops.
- Writing letters.
-

TERM OF REFERENCE

Commonly soping is completed when a document (often called terms of reference) is produced setting out what the EIA is to cover (scope of EIA) and how is to be managed (schedule of activities). The terms of reference TOR should also be flexible to adapt to changes that may appear during the assessment.

The main components of the Terms of Reference document are:

- Background to the project.
- Setting the context for the problem.
- Alternatives (site and processes).
- Institutional and public involvement.
- Required information and data.
- Analysis of impacts.
- Mitigation and monitoring.
- Conclusions and recommendations.

The terms of reference can also contain:

- Schedule.
- Budget.
- Outputs reports.
- Negotiations in case of variations.

ANNEX 1.4

CONTENTS OF ENVIRONMENT IMPACT STATEMENT (EIS)

1. EXECUTIVE SUMMARY

The executive summary is a non-technical summary of the EIA study. It is the part of the report that is ready by most people. Thus it should be written in a clear way avoiding technical details. The executive summary is normally of 1-3 pages long. However, it may extend to 10 pages for large projects. In some cases where projects are of wide public concern, it is a common practice to have a summary volume that can be widely distributed to interest people.

Executive summaries contain:

- Tittle and location of projects;
- Name of proponent;
- Name of EIA preparer;
- Brief outline of proposal;
- Significant impacts; mitigation/compensation measures;
- Proposed monitoring.

2. INTRODUCTION

This section introduces briefly:

- The purpose of the EIS;
- The scope of EIA;
- An overview of the undertaking;
- The regulatory process framework;
- The study strategy.

3. PROJECT DESCRIPTION

This chapter typically covers all information related to the undertaking in terms of need, component, activities, phases, facilities, and the schedule. It is also very important to include information about environment design features being adopted, and plans for employment and skills procurement.

A typical table of content for a project description chapter is as follow:

- Proponent Name
- Project overview
- Rationale and need
- Alternatives
- Site and route selection
- Facilities
- Environmental Design Features
- Project phases
- Employment and skills
- Environmental Management Plan
- Benefits Implementation Plan
- Schedule
- Emission, discharge and solid waste
- Zones of influence

It should be noted that the purpose of project description is to enable identification of major issues and concerns as well as to provide a basis for impact analysis. In preparing project description, the author should know the intended audience, as the technical format of the project description may vary accordingly. For example, if an EIS is to be read by technical terms and information. Project descriptions of less technical nature are prepared for public use.

4. ISSUES SCOPING

In this section, the results of the public and regulatory consultation processes are given. These include:

- Range of issues raised by the public and regulatory authorities
- Key issues identified
- Terms of reference.

A list of persons consulted and meetings held can be added including one-to- one meetings and public meetings.

5. EIA METHODOLOGY

In this section, a description of methodology adopted in analyzing and assessing the impact is given. For example, the EIS prepare can describe:

- How were valued environmental components determined
- What boundaries are
- Which methods were used to evaluate impacts
- Which significance criteria has adopted

6. ASSESSSING POTENTIAL IMPACTS

This is the focus of EIS. The EIS prepare should present the results of the work conducted for each of the valued environmental components (VEC) as follows:

- Establish ecological context
- Establish boundaries
- Establish criteria for evaluating significance
- Describe existing environment
- Review mitigation specific to VEC
- Impact analysis:

- Identification of project VEC interactions
- Identification of issues and concerns with project VEC interactions
- Consideration of existing knowledge about project VEC interactions
- Impact assessment

- Determining residual impact significance or acceptability
- Monitoring and follow up
- Summarizing impact analysis

7. CONCLUSION

Major findings of the assessment, particularly the predicted impacts are highlighted. Recommendations are also made regarding the acceptability of the proposed project taking into account the opportunities for mitigation, compensation, and monitoring. In case of assessing alternatives, a comprehensive review of residual impacts can be presented.

8. APPENDICES

- Data
- Component studies
- Detailed analysis
- Minutes of Consultation Meetings
- ETC

The Hashemite Kingdom of Jordan

The General Corporation for the Environment Protection

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for Environmental Impact Assessment
and
Environment Impact Statements

DRAFT PROPOSAL

Sector:

FOOD PROCESSING INDUSTRY

This present document concerns the sector of industrial processing 1 activities in general, and the sub-sector of FOOD PROCESSING in particular.

As industrial processing in the various sub-sectors follows similar processing principles, logical lines, and basic techno-organisational logistics, structure and infrastructure, the present Directive provides orientation and guidance in two distinct parts:

PART I pertaining to processing industries (1) in general, and

PART II containing particular additional information and instruction specific to the sub-sector of Food Processing.

-sectors such as: Textile, Paper, Leather, Hides and Skins, and Timber processing, Chemical and Pharmaceutical industries and others will be available upon request.

PART I
DIRECTIVE
ENVIRONMENTAL IMPACT ASSESSMENT And EI-STATEMENT

ORIENTATION and GUIDELINES

Processing Industries 1

SECTION I

CHAPTER 1 The presentation of the proponen

Shall be presented under this first chapter, the propo
and function, his situation of responsibility for the activity subject matter of the EI-Statement, his full address, telephone and other communication links.

Equally shall be made known, the specialist entrusted with the elaboration of the EIA and EI-Statement, by indication of his name, function full address, telephone and other communication links.

Evidence shall be provided of his sound professional qualification for the specific study undertaking, and for his status of independence.

CHAPTER 2 Summary information

of the EIA and EI-Statement to the decision-maker:

- the planned activity subject matter of the present EIA and connected statement, and its justification;
- its aims and purpose;
- the major impacts it may have on the environment, and the alterations it may generate to the various environmental compartments and biotypes, as wel
- the comparison of the impact with established norms and standards.

The latt -Statement may, if applicable, indicate the positive impacts originating from the activity and beneficial to the social and economic development of the country, a region or a selected area or community.

Thus, the Summary Information shall be concise, clear in its structure and expression, well referenced and without ambiguity and polemics.

CHAPTER 3 Legal and institutional setting of the EI-

All legal references shall be indicated, that apply to the planned activity, to its implementation, and to the present EI-Statement.

Such references shall include all particular laws, by-laws, codes and regulations that govern the implementation and operations of the planned activity as well as eventual particular conditions and/or characteristics of the activity or the implementation site / environment, and, in given cases, international law, conventions and declarations pertaining to environment protection, to restricted or prescribed activities, areas, material and the like.

The chapter shall as well include information about eventual special conditions issued by financing organisations (regional / international) or international co-operation and pertaining to norms and standards in general or in particular: to EIA.

SECTION II CHAPTER 4

1-General presentation of the activity

This general presentation shall be based upon appropriate mapping of the implementation site, its surroundings and access ways. Shall be indicated distinctly: the production unit(s), auxiliary unit(s), structure, buildings and general services.

Furthermore, the sub-chapter 4.1 shall inform about:

- the structural and functional links between several units,
- the identification of the planned processing methods and techniques, their respective license owners, confirmed references in Jordan and in the greater region, of such processing technologies and their application.
- Summary plan (at scale) of the implementation site.
- Presentation of the implementation programme indicating the implementation method (turn key, modu

This presentation shall equally identify:

- the planning engineer and eventually
- the construction company, if already retained,
- the provisional time schedule for implementation and start-up of operations.
- The planned or eventual extension phases (physical or production volumes);
- required for the implementation of the activity (transport, energy, water, workers hous
- estimated cost of the implementation: production units, environmental utilities

(pre(treatment of industrial waste water, other emissions, solid waste mana

2-Detailed description of the activity, and preliminary identification of sources of eventual pollution.

This sub-chapter starts from the general aim and purpose of the activity, and it shall describe all and any element of the industrial implementation and future operation that may have interrelation with the environment and eventually cause significant negative impacts on the environment and on the process of sustainable development of the country.

It is important to note, that any non pertinent information shall be avoided, and will not be received by the authority.

Thus, the description shall include comprehensive information including:

(i) site preparation and construction,
(ii) operations of the processing plant,
(iii) handling of raw material: transport, loading and unloading, stor
(iv) energy production operations,
(v) infrastructure (access utilities),
(vi) particular risks and accidents,
(vii) waste discharge, treatment and management,
(viii) maintenance management, monitoring and control.

2.a Site preparation, and construction

The required description shall concern:
the planned implementation works as well as the prior site preparation works; site clearance and earthworks, provisional access ways construction and material storage improvements;
construction works, techniques and particulars.

The description shall be concise and clear, and indicate any foreseeable risk of pollution and other impact on the environment.

The description shall be completed by a scaled map and plans, as well as by a provisional implementation schedule.

2.b Operations

- Brief but clear description of the main processing techniques available for the various units and production stages, and indication of the criteria and justification for the selection of the retained processing techniques.

- Description of the retained processing techniques, supported by graphs, charts and explanatory schemes regarding: the routing and the sequences of the processing, the circulation of liquids and gas, physical operations, chemical reactions etc.
- Indication of raw materials, products, sub- and by-products, emissions, waste and other emanation.
- Identification of all and any operation pertaining to the processing and to the functioning of the plant,

- according to their nature: normal operation (continued, discontinued, intermittent or emergency operation), cleaning of the unit, maintenance operation etc.

The various sources of noise and gaseous emanations, liquids and solids shall be indicated.

2.c Handling of raw material, sub- and by- products, and finished products.

The description shall include all of the handling operations of raw materials (including of chemical products), sub- and by-products and finished products:
unloading, loading, transportation, pre-treatment, storage and other operations undertaken on the site of the future activities or nearby.

The description shall work out particularly regarding potential pollution cases (risks), and briefly evaluate the importance of such risk (probability, qual

2.d Energy production, and other utilities.

Shall be described: all and any installation planned for energy production and supply to the industrial unit.

The description shall include graphs and schematic drawings showing the process of arrival, storage and handling

The emissions, effluent and waste generated by such energy production operations and likely to cause negative impact on the environment, shall be indicated and evaluated.

2.e Transport requirements.

The required infrastructure for road and/or rail access shall be described. The expected traffic shall be indicated in terms of quantity, frequency, origin and/or destination; shall also be indicated in the type and nature of the planned transport: personnel, mat

In cases, where specific transport infrastructure improvements are planned such as: harbour, railway station, multi- -Statements to be established and submitted separately.

2.fSpecial risks and accidents.

The risk of accidents and emergency situations shall be indicated and evaluated as follows:

- identify and evaluate the risk of accidents from potentially dangerous products. Indicate their place of storage or application as well as the security provision planned as part of the present activity / project.
- Identify the risk of accidents and emergency situations that may be caused by deficient installation or malfunctioning of the latter and thus lead to significant environmental damage.
- Identify and evaluate eventual and/or accidental malfunctioning or any other danger caused by human error of the operating personnel, by material ageing or usury, corrosion, the loss of control over the processing plant,
- Quantify the probability of any of these major risks, and their consequences taking into account the possible interaction with surrounding products, processing plants, by-products etc.
- In cases where occasional overload, overcharges or overflow may be unavoidable, indicate how the probable pollution and induced incidents can be contained, and how security provisions in utilities and/or special installations can interfere in order to prevent from major pollution and damage to the environment.

2.g Management of solid and liquid waste, pre-treatment of effluents.

All planned installation and techniques for waste collection, disposal and treatment as well as liquid waste pre-treatment shall be described, including methods of treatment / pre-treatment and control provision.
Graphical support and charts are considered helpful to clear description.
The final treatment and discharge areas / sites shall be indicated by the EIA.
The control methods shall be indicated, as well as intervention programmes for any case of major malfunctioning or accident.

2.h Maintenance management, - monitoring and control.

The monitoring and control system shall be summarily described (*a detailed description of the maintenance management remaining reserved for chapter 13 of the present EI-Statement*).

The monitoring system shall primarily function in order to detect and to inform unexpected and significant pollution of the environment, and it shall be designed such as to initiate instantly appropriate intervention and curative measure.

3. Balance of material flow:

Entries, output, effluents and waste, norms and standards.

The entire flow,

In general for the production entity, and in particular for each processing unit or sub-unit -, for raw material, auxiliary material and effluents and waste (before and after treatment) shall be demonstrated in the form of flow diagrams, - dimensioned and well explained. Different flow diagrams shall apply to the several cases of operations as indicated in chapter 4.2 b above.

These balances indicate in volumes and in quality terms, all of the entries and outputs of the raw material, additional material, utilities, products, sub- and by-products, waste and effluents, evaporations, emanations etc. The description of the qualities shall include the chemical composition, the physical composition (temperature, pH etc.)

- The list of analytical methods shall be enclosed with the annex to the present EI-Statement.

- Noise and vibration levels shall be indicated,

- for occasional and/or intermittent waste and effluent production, frequency, duration and estimated quantities shall be notified.

Norms and standards,

all and any national norms and standards applicable to the activity shall be listed.
In any case of non-availability of Jordanian norms, standards or similar guidelines, international norms shall be used.
However, in such cases, at least three different international norms shall be indicated, and at least one shall originate from a European industrialised country and one other from a country with similar environmental conditions as those prevailing in Jordan.
The choice of the referenced norm or standard shall be justified.

CHAPTER 5
Alternative solutions, and justification of the final option

The justification of an industrial project refers usually to its aims and objectives, market opportunities and demand, techno-commercial principles, study approaches to identify and to integrate into the concept and implementation programme, a maximum efficiency, and sustainability.

Such approach implies references to the various alternative solutions that have been investigated, and to the criteria applied for selecting the final solution subject matter of the present EI-Statement.

Thus, the present chapter shall contain as a minimum:

- a brief presentation of the sector / sub-sector, its condition in terms of demand and existing offer, its techno-commercial functioning, deficiencies, major challenges and flexibility;
- the functional and techno-commercial criteria for the selection of the implementation site for the activity, - with pre-defined input and output quantity margins, the principal design criteria for the identification of the most efficient solution in terms of processing techniques and efficiency, operations, utilities and access, economics, social benefits and environmental compatibility.
- the various solutions (site and implementation) investigated and developed prior to final option of the present solution,
- the selection criteria applied for the evaluation of the various alternative solutions, and the justification of the final selection.

It is important to note that such justification includes all of the aspects of the very activity in its global setting, - technically, economically, socially and environmentally -, and it incorporates the entire activity undertaking from site selection through implementation, operational phase, extension, closing down, land reclamation and final restoration of the site and the environment.

CHAPTER 6
The Potential Impact Area

The Potential Impact Area incorporates all and any of the space related dimensions exposed to pollution risks or significant impact emanating from the activity, - directly or indirectly. Consequently, it shall include the implementation site and its surroundings, the latter to be dimensioned in function of its various exposures to the different types and nature of risks; the delimitation of the air space risk areas shall always be the projection of the latter on the ground level.

As the validity of the entire EI-Statement depends on the pertinence of the impact study area, the importance of its delimitation as well as its implication on study rationale and economics are evident.

It is however, that direct impacts induce rather often indirect reaction within the synergetic compound of an ecosystem that can hardly be foreseen without in-depth study and analyses of the condition of the environment and the importance and characteristics of a given impact. Consequently, it is suggested to opt for a two-step approach for defining the potential impact area:

Step 1:define at the initial study stage, a preliminary area limit incorporating the propagation lines and areas of the various emanations and significant impacts likely to be generated by the activity. Thus, this initial delimitation designs an envelope of a series of specific impact sub-areas.

Step 2: With the ongoing study work on the analyses of the present condition of the environment, its particular sensitivities and ex etween the various environmental compartments and site specific particulars as well as with the increasing knowledge and experience resulting from the impact analyses and assessment, an adjustment of the potential impact area may become necessary that implies consequent adjustment, and eventually complementary study work regarding the environmental implications over-covered or not covered by the initial delimitation. (see also Annex 1. 2)

CHAPTER 7
The Time Horizon of the activity

The time horizon aimed at by an activity, or by a project, is important and decisive for successful EIA and pertaining Statements, evaluation and approval; successful EIA being conditioned by its application to the entire and integral time span and horizon of an activity:

- pre-implementation phase,

site acquisition, and preparation of the site and its surroundings (provisional access ways, material storage, workers housing),

- construction phase,

production units construction, annex facilities, infrastruc

- start -up and operations phase,
- planned or probable extension phase of the structural improvements and/or of the production capacities and activities, the annex facilities and/or the related infrastructure improvements;
- closing down and dismantling phase,
- and reclamation and final restoration phase of the site and its environment.

The impacts may vary from phase to phase, - as it regards their type, nature and importance, and an accumulation of negative impacts is not to be excluded!

Consequently, it is an important requirement (and task of the EIA) that the EI-Statement includes a clear description of the state of the environment before the implementation of the activity, as well as evolution forecast through the entire lifetime of the activity for the case of evolution without the event of the activity.

The appreciation of the final environmental statement and balance shall strongly depend on the comparison of the two evolution scenarios: without activity with activity.

CHAPTER 8
Description of the environment

The accurate identification and correct assessment, evaluation and appreciation (by the decision-maker) of the impact originating from the activity, will strongly depend on a qualified and thorough description and analyses of the state of the environment concerned.

It is therefore of outstanding importance, to carry out this part of the study with utmost care, in-depth and application, and to present the relevant findings in a most transparent and comprehensive language and format.
Such presentation shall be supported by pertinent illus
demonstrational material, and all and any references and sources shall be clearly indicated.

Voluminous source and reference material may be submitted to the authority in an annex document to the present EI-Statement.

The following information concerning the structure and contents of the present chapter, is indicated as guidance only, and it is not exhaustive.

The chapter to contain presentation of :

The physical environment

It shall be described and documented in particular (but not exclusively): the natural site conditions such as the topography, hydrography, hydro-geology, climatology and air quality (particularly shall be indicated existing pollution charges and levels such as: particles, oxides of sulphur, nitrous oxides, carbon

vibration level, etc.

the biological environment

the fauna and flora, including of the important wildlife habitats, protected / endangered species, unique or rare ecosystems, forest and fishery re

the human environment

the resident population, their demographic, socio-economic and social condition and trends, existing facilities (education, health, civic), prevailing occupations, socio-professional strata and income level, land use in the area (agriculture, tourism), areas of unique or exceptional ecological or aesthetic quality and values, important recreational, cultural or historical areas.

SECTION III
CHAPTER 9
Identification and analysis

The subject matter of the present chapter addresses three distinct study activities:

- identify the significant impacts,
- analyse and quantify the impact,
- assess the environmental compatibility (by comparison to established norms and standards e.g.)

The identification shall be undertaken in a systematic way and approach in order to ascertain entirety.

The analysis and quantification shall be based upon recognised methods, qualified specialist support (licensed laboratories e.g.), and be documented in a most transparent format (annex to the EI-Statement: laboratory reports, tests and evaluation methods and formula, resource literature, documents, persons).

The environmental compatibility shall refer to established national norms and standards, and only in the absence of those, comparison to international norms shall be applied. In the latter case, at least

- three different norms shall be indicated, including
- one of a European industrialised country and
- one other from a country with most similar environmental conditions to those prevailing in Jordan.

The choice of the finally selected norm of reference for the present EIA, shall be clearly indicated and justified.

It is important to note, that the significant impacts on the environment to be identified include those that occur and those that may occur accidentally.

The source of the impacts may be direct or induced (indirect), - in first or subsequent generation, immediate or timely retarded.

The most reliable, transparent and justified method for impact identification being the crossing of the various single elements of the activity (chapter 4) with the various single elements of the environment (chapter 8), a matrix method (see example in the annex hereto) may be applied.

The same matrix could be used for synoptic indication of the environmental compatibility, reveal clearly the eventually required measures for the reduction of :

Impacts, and finally justify an ultimate matrix and notify the decision-maker of the environmental balance values

Besides the comparison of normalised dimensions and an appreciation based upon the importance of the margin between value forecast and legal limitation, there are various other criteria to be considered by a comprehensive evaluation such as:

- General importance, duration and intensity,
- Type and nature of the pollution incidents,
- Reversibility,
- Direct impacts, indirect impacts,
- Accumulation effects and synergy.

GENERALITIES

Each and any articulation of the activity likely to generate an impact whatsoever on the environment, shall be identified and described as regards its foreseeable importance, expansion and duration.
Main elements for such description shall be the geographical limits / zone (the point / zone of impact may correspond to a distinct area, inside or exceeding the boundaries of the implementation site or the pre-defined - thus preliminary - impact area), and the type and importance of the environmental elements affected (resident population, other living elements, other valuables).

The elements for the assessment and measuring of the intensity of the impact shall include the noise level, the quantity of solid or liquid or gaseous pollution (in internationally recognised dimension units / metric system, such as mg/m3, or mg/l)

The duration of their impact may be limited, to episodical occurrence, to a project phase (construction period e.g.) long lasting (lifetime of the activity), or even permanent, if the pollutants are extremely resistant.

Thus, it is important to note in the present chapter, whether a pollution is continuous fact, intermittent, accidental.

TYPE AND NATURE OF THE POLLUTION INCIDENTS

The impacts and subsequent alteration and deterioration may be numerous and various, and they are function of the hazardous relation- *pollution environmental reaction*. Thus, they may impact unlimited varieties of environmental compartments including of the human health e.g. (cancer, oductivity, microclimate etc.

REVERSIBILITY

Certain impacts can cause non reversible damage such as deafness consequent to extreme noise exposure, impact of heavy metal pollution, or desertification.
An impact or an environmental alteration shall be considered important if there are limited chances or none, to revert the damages.
Reversibility in general, that may reduce the importance of an impact, is a function of natural forces and

Direct impacts are the reactions of the environment in function of and subsequent to their contact with a pollution emanating from the activity (toxic fumes is emanating from the industrial plant affecting directly human health).
_____ in cases where the pollution itself does no visible harm the environment, but initiates alterations that cause damage or deterioration elsewhere, within the impact area, outside, at the time of the pollution event or at any later time:
(heavy metals penetrating into the nutritional chain:
>ground water
or, as another example: sediments retained in a barrage may impact soil fertility downstream, and even fishery resources in coastal areas that no longer receive nutrients enclosed with the retained sediments, >losses for the fishery industries and socio-economic negative thus: indirect impacts.

It is important to note that the outstanding weight that EI-Statements evaluation and decision-making may attribute to indirect impacts, as they are often hidden though very obstructive to sustainable development, - often even more than direct impacts generally easy to reduce or to control by appropriate mitigation measures.

ACCUMULATION EFFETCS AND SYNERGIES

The process of assessment of the environmental compatibility shall include and accumulate all and any of the impacts, besides their evaluation on a particular and single impact level.
Such double approach is very important, as quite often, a single impact may have insignificant incidences on the environment, but if several impacts of interrelated nature are added, the total of their impacts may become significant.

Equally, one single pollution case may have insignificant impact if the time span of one pollution case to the n
If however, similar pollution cases occur repeatedly and if the pollution concerns chemical products for example, with high persistency level (like pesticides deriving from hydrocarbon chlorides), they may not be toxic for animals at low quantities and short-term exposure, but at longer term, its effects may become fatal.

Equally as well, synergetic effects increase the importance of an impact, and the reaction of two or more pollution simultaneously, may be much more significant than a single impact phenomenon, - one by one.

RECAPITULATION MATRIX OF THE IMPACTS

A matrix similar to the specimen exhibited earlier in this chapter may be used to recapitulate the various impacts identified and evaluated. In order to indicate the note of environmental compatibility, it is recommended to restrict to either simply three different notes (- . O . +) or to a maximum of five different appreciation (= . - . O . + . ++). The indication in the matrix has only synoptical character as addition or compensation of the various impacts is excluded by the difference of their nature. Thus, explanatory summary notes are necessary.

CHAPTER 10
Mitigation measures

Mitigation measures shall be applied wherever harmful impact constitutes a risk for healthy environment. Those measures shall lead to avoid, to reduce or to compensate negative impacts.
There exist three different types of mitigation measures and the proponent or his independent consultant for the EI-Statement shall not confound them:

Measures to attenuate (or to avoid) an impact consist of a technical or organisational complementary arrangement, implemented by their owner on his own account, and as part of his activity and obligation, and for the only reason: to protect the environment against the risk of damages eventually caused by his activity, - throughout its entire lifetime;

Compensation measures for environmental damages that will be caused by the activity, and to be entirely born by the owner.

Such measure may be applicable to cases, where the residual impacts remain important (even after application of attenuating measures), but where the particular nature of the environmental alterations allow for an equivalent compensation: - within the impact area of the activity, - outside the latter or even - outside the contextual frame of the project (e.g. resettlement, replanting of trees).

It shall however be noted that such type of mitigation measure shall only be considered by the decision maker in cases, where the positive impacts of the activity on the sustainable development of the region are felt <u>important</u> by the authority.

Attenuating measures as described here above, but that shall be born and undertaken by third.

This type of measure shall apply to cases, where one or several impacts, direct or indirect, are generated by the activity, but cannot be charged to it (example: heavy traffic increase du to massive job creation through the activity, and traffic overload on a distant road interchange).

In such case, the required adjustment of the public infrastructure to the dynamics of the socio-economic development shall not be charged to the account of the activity, but be born by third budgets.

In order to assist in identifying possible mitigation measures / practices, some practical advice or examples are listed hereafter:

Appropriate siting:

-
  or
- select site convenient for easy road access, transport of personnel, discharge of waste, appropriately distant to residential areas and sensitive health or educational facilities
- avoid siting close to riverbeds / water courses,
- avoid siting in areas with inversion risk,
- avoid siting close to protected areas (residential recreational, forest, nature parks, natural or national reserves)

Operations:

- pre-treat liquid effluents,
- recycle treated effluents, if possible (cooling systems),
- filter gaseous emanations (fabric filters, electro-static filters),
- manage solid waste: collection, treatment, recycling, disposal,
- maintain proper and safe material storage,
- minimise energy requirements and employ at maximum renewable energies and proper technologies,
- maintain environmental monitoring and safety control,
- organise transport flow to minimise impact on external traffic condition and safety,
- apply noise abatement measures,
- train workers in environmental protection and safety measures,
-

CHAPTER 11

Summary estimation of the financial implications

For all cases of the three types of mitigation measures as indicated in the previous chapter, the financial implication of the proposed arrangement shall be summarily estimated, and indicated at the cost rates and values as current at the time of the submission of the present EI-Statement for evaluation and approval.

SECTION IV

CHAPTER 12

Final balance and environmental statement

The present chapter shall be introduced by a brief reiteration to the key elements of the EIA, and to the various results, findings and conclusions.

Thus, it shall be briefly recalled that :

- the initial condition of the site and the environment, with an emphasis on the particular sensitivities;
- the main action of the project (throughout all the phases of its lifetime),
- the negative impacts, indicated in decreasing order of their importance, extent and reversibility, the residual impacts, and
- the firm engagement of the owner regarding the implementation on his account, of all of the proposed mitigation_measures and of the measures for final land reclamation and restoration of the site and the environment;
- the positive impacts (social benefits, economic advantages).

Regarding the environmental balance:

nce
positive and negative impacts. Such approach is not possible, as till date, no common scale exists allowing, - for the benefit of sustainable development -, for accounting in a unified approach, impacts on the physical environment e.g. and impacts on the socio-economic or cultural human environment!

It is important however, that the proponent shall try to expose in a very clear and transparent manner, the positive attainments and results to be expected from the planned activity (during and after a lifetime) on sustainable develop -
damages to the environment.

Such demonstration may be accompanied by a matrix similar to the format as exhibited in Chapter 9 here above.

In this same present chapter, and in the form of a general conclusion, the proponent may propose and bring to the attention of the technical evaluation staff of the authority, and of the decision maker, his own final appreciation of the impact and environmental compatibility, accompanied by due and plausible justification.

SECTION V
CHAPTER 13
The maintenance management plan

As environmental monitoring and control of the entire activity and of its emissions and other implications on the environment are a necessary and binding obligation, the authority requires from the proponent of the present EI-Statement, a comprehensive maintenance and environmental monitoring plan.

The authority shall evaluate this planning document and approve in conjunction with the EI-Statement.

This plan shall contain (not exhaustive example):

- the plan for the monitoring of the environment during the implementation phase of the activity,

- the periodical control of the condition of the environment and its different and various compartments, within and around the project area, and during the operations phase, eventually dismantling and restoration of the site and the environment;
- the monitoring and control of all liquid waste, surface water and underground waters, sampling, analyses and counter analyses to be undertaken by qualified and licensed laboratories;
- the permanent monitoring and control of the air quality within and around the project area, sampling, analyses and counter analyses by application of certified measuring methods and instruments;
- permanent training of the owners professional staff in the fields of environmental protection and prevention of eventual negative impacts;
- the permanent adjustment of base data for the environmental compatibility of the activity, and in particular of those not available during the study and planning phase (e.g. pluri-annual climate data).

CHAPTER 14
ANNEX

In the annex to the present EI-Statement, shall be submitted all and any additional and detail information that may be instrumental and useful for the authority, to verify the multiple information and data, analyses and conclusions, and in particular but not exclusively:

- all reference documents and data, additional information and sources, analyses reports, maps, photographs, photo-interpretation etc. such as referenced in the present EI-Statement;
- simulation out-prints and modelling results,
- bibliographical references (publications, documents, studies, research reports etc).

PART II

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ENVIRONMENTAL IMPACT ASSESSMENT
EI-STATEMENT

(1) ORIENTATION and GUIDELINES

Processing Industries

SUPPLEMENT TO THE DIRECTIVE

Containing particular additional information and instruction specific to the sector of Food Processing

Food processing industries including of the sub-sectors of meat and fish processing, fruit and vegetable processing, flour and oil milling diary plants, breweries and bottling units etc; are

usually large scale water consumers and consequently, large wastewater producers.
Equally, the production of solid waste, mainly of organic nature, is largely above the average production of most of the other sectors of industries and crafts.
Common use in food processing for local or export markets implies conservation measures. The latter traditionally require the use of chemicals or short wave, sometimes even radio-active treatment affecting, if not properly operated and well maintained, the product and the environment, - working environment, or through waste and airborne action, waterborne or amination, the environment outside of the plant.

In consequence of these particulars, special attention is required when elaborating the key chapters (n -Statement.

1- WATER CONSUMPTION

Water is a limited resource in Jordan, and water wastage is obstructive to sustainable development. Thus, the industry is obliged to opt for or to develop, processing techniques with reduced water requirements. As in the sub-sector of food processing, cleaning and washing are essential to hygiene and to the consumers health, mainly two means of economising water are likely to be emphasised:

- recycling water within the plant (washing and cooling, sanitary water), a method that implies proper treatment facilities, - however feasible, 'rentable' and largely available on the technology markets;
- cleaner production of raw materiel, particularly in the field of fruit and vegetable production and processing (reduction of chemical treatment with pesticides, fungicides).

2- WASTE WATER

The issue is connected to the above water consumption>. Recycling of treated effluents will reduce the quantity of waste water. Excess quantities as well as qualities unfit for recycling shall be pre-treated on site and conditioned (decontamination!) for agricultural or similar use in nearby areas or for recycling to groundwater basins (negative wells).
In no case, uncontrolled waste water disposal will be admitted, an in any case of contravention, the authority may refer to and act by reference to the Environ

3- SOLID WASTE

Likewise the liquid waste, food processing produces exceptional amounts of solid waste, mainly of organic consistency and type.
As proper waste disposal requires increasing means and services, the owner of a food processing plant should arrange for his own appropriate facilities to minimise the quantities to be discharged for costly

treatment and disposal. Various technologies may be applied to reduce the solid waste, to valorise parts through appropriate treatment (industrial sub-products, animal food, composting) or to arrange for final disposal on the project site.

4- SPECIAL WASTE

In any case, care is required in liquid and solid waste treatment regarding toxic or dangerous pollutants

from deficient animal health.

A particular care is required, where radioactive treatment is applied (some diary products, eggs, spices, and other dry food).
Appropriate treatment is necessary, and waste contaminated or contaminated waste shall be processed separately.

The EI-Statement to bring appropriate evidence to the attention of the decision-maker.

5- GASEUOS WASTE

Contaminated gaseous waste emanations (toxic fumes etc) shall be treated through suitable filtering. Several efficient technologies are available on the cleaning technologies markets.

THUS:

The EI-Statement shall concentrate beyond the general lines of the above Directive, on:

Subject 1 and 2: Water supply / waste water

Reduction of consumption of fresh water
Introduction of the use of recycled treated effluents (TSE),
Reduction of waste water,
Control of wastewater quality
- physico-chemical characteristics

(SM, BOD, COD, toxicity, colours)
Pre-treatment of final effluents,

Re-use of mud, and recycling of TSE to groundwater reserves.

Subject 3: Solid waste

The different branches of the industry produce different type of organic waste.
fruit and vegetable industry produces mainly peelings, crust, grains, stones,
fish processing industry leaves shells, heads and fishbone,
bottling plants produce mainly packing waste ,
oil mills leaving margins
etc

Thus, the EIA shall identify and specify the nature of waste, define the most efficient treatment, recycling sposal or elimination.

Subject 5: Air pollution

Certain industries such as flourmills produce large amounts of dust and gas (often fermentation gas).
The EIA shall thus determine:

the nature of the dust,
the quantity of dust contaminated and contained in the emanations - total quantity/day emitted,
the nature and physico-chemical consistency of the gas produced during storage and processing.

Subject / Noise pollution

Determination of the sound levels inside the production units, and outside,
protection measures for the workers and nearby residents,

Subject / Transportation

Food processing industry usually creates excessive transport needs and activities.

In order to control eventual implications on outside traffic safety (motor traffic and pedestrian circulation), precautions shall be applied and efficient measures be developed and implemented:

Well designed access ways, parking and loading areas, manoeuvring space,
transport schedule control such as to avoid transport activities during rush hours,
transport management such as to avoid unnecessary movements.

The Hashemite Kingdom of Jordan

The General Corporation for the Environment Protection

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for Environmental Impact Assessment
and
Environment Impact Statements

B. DRAFT PROPOSAL

Sector:

QUARRYING AND MINING INDUSTRIES

This present document contains two parts:

PART I- a general presentation of the sector, a summary overview, and essential particular considerations, and

PART II Orientations and Guidelines for EIA and EI-Statements

PART I

A general presentation and overview of the sector, and essential particular considerations.

INTRODUCTION

QUARRYING and MINING

The present section will provide an overview regarding the major interrelations between the activity and the environment.

The most likely impacts of quarrying and mining are function of the location of a mine, of whether surface or underground operation, of its characteristics and use of the mining area, the physical and chemical properties of the resource and the method used to mine it, processes used in mineral processing operations (e.g. ore concentration) etc.

As it is not possible to describe within the present context, details and particularities pertaining to all types of mining and processing, the section will attempt to provide general information applicable to most and major types of mining and quarrying. Thus, differences between surface and underground mining are considered, whereas specifics and singularities remain subject to particular annexes.

Such singularities include high-risk minerals (toxic, highly radio-active or high health hazardous minerals) as well as specific mining such as dredging and leaching.

The principal aim of the section is to provide aids for identification of activities, sub-activities and connected articulation thereof, likely to generate significant impact on the natural and human environment, and therefore to be studied during pre-project stage and be monitored after the implementation of the project.

General suggestion on environmental mitigation are provided in Part II.

The objective of the Directives pertaining to EIA and related statements for activities in the industry of QUARRYING and MINING.

The subject matter of the present document being EI-Statements in compliance with the legal provisions and in conformity with the details of the procedure established and enforced by GCEP, the aims of the Directive are:

> to provide to developers detail information concerning the application of the legal references and the procedure related to EI-Statements, evaluation and decision, and to provide guidance for the elaboration of Terms of Reference pertaining to EIA and Statements for particular projects in the various fields of quarrying and mining.

There are multiple methods and approaches for EIA study undertakings, and the choice remains an option of the owner or of the specialist consultant entrusted with the elaboration of the EIA and the pertaining Statement.

The minimum consistency of an EIA and EI-Statement is stipulated by the By- ../99, and further defined in an annexe thereto.

The structure of an EI-Statement and the sequence of the various study chapters of the EIA, are prescribed by the present Directive, and they are binding.

General information regarding the sector.

The extraction of rock, minerals and energy resources in the quest for economic development involves a sequence of activities which have environmental implications.
Many rock material,, mineral ores and coal supplies are readily accessible trough strip or surface mining operations. When a mineral, rock or fuel deposit lies at a depth that the cost of removing the overburden is prohibitive, the resource is extracted by underground mining operations. Examples of such resources are coal, copper, lead, zinc, molybdenium and uranium. The environmental impacts of these two mining practices are distinctively different. Surface mining has a particularly disruptive effect on the landscape and land use and occupation patterns, mainly because it requires the removal of the overlying vegetation, soil and rock (overburden), and because it affects usually large surfaces or strips of land. Surface mining is usually less expensive than underground mining. However, even in situations where underground mining would be feasible, surface mining is often favoured because it permits more complete extraction, and it is usually less hazardous to the safety and health of the miners. The considerable danger of collapse or explosions in underground mines is virtually non-existent in surface mines.

Although underground mines generally produce less waste than surface mines, the spoils are heaped on the ground in the vicinity of mine sites where they cause the same problems that attest surface mining spoils acid (or toxic) runoff, air, surface and water pollution (dust, heavy metals, radio-active gas, liquids and air-born particulate), erosion, sedimentation, landslides etc. The destruction of landscape, drainage systems, human environment and land use patterns, wildlife habitat and subsequent ecological and social impacts caused by underground mines are usually different to those of surface mines.

The activities usually involved in quarrying and mining projects include e.g.:

- exploration and prospecting for minerals,
- selection of the mine and spoil disposal sites,
- site preparation and construction of facilities (offices, laboratories, pipelines, transmission lines, access roads, railways),
- mining operations (blasting, breaking, crushing, milling, washing, drying, conveying, sorting, pore-screening,
- energy producing operations,
- water supply,
- transportation,
- mineral processing,
- spoil disposal,
- waste water discharge,
- workers housing and services,
- land reclamation and restoration.

Prospecting and exploration

The environmental impacts of preparatory activities, such as prospecting and exploration for minerals are usually non significant but in some cases the latter may involve, for instance, blasting and drilling operations with significant noise and vibration. The psychological and subsequent socio-economic impacts may also be considerable, as such preparatory activities indicate the future connected opportunities of mining an area. This may give rise to fears or expectations among local communities and induce, for example, migration and land speculation.

Site selection

The determination of the most suitable location of the mine site is critical, on the one hand, to the economic viability of the project, and on the other, to the environmental impacts. An open-cast (surface) mine will destroy large areas of land for a relatively long period of time; Therefore it is very important to consider the importance of other land and water uses in the area as well as its ecological values. The related surveys and studies should consider e.g.:

- availability of raw-materials,
- availability of energy supply,
- availability of water supply,
- availability of appropriate transportation facilities and infrastructure,
- location of human settlements (at risk),
- ecological conditions (existing flora and fauna, sensitivity, importance to different land
- hydrological, hydro-geological and meteorological conditions,
- capacity of receiving waters to assimilate treated effluents,
- present and projected beneficial uses of downstream water resources (water supply, fisheries, recreation, etc)
- availability of land for solid waste disposal,
- socio-economic and cultural conditions.

Site selection plays an important role in determining the needs and cost of necessary environmental mitigation measures (e.g. resettlement and compensations for people to be displaced, air and water pollution control; erosion control, restoration etc. Alternative sites and locations of the mine site as well as spoil disposal sites, housing areas, routes for pipelines, roads and railways and wastewater discharge must be considered in order to minimize adverse impacts.

Site preparation and construction

The main activities having potentially significant environmental impacts in site preparation and construction stages of a mining project include for example:

- land clearing,
- surface,
- construction excavation of access roads and railways,
- construction of transmission lines and pipelines,
- construction of offices, laboratories and other buildings,
- barriers, including fencing,
- blasting and drilling transportation, material storage,
- housing and other services for the labour force,
- migration / resettlement of resident population.

Mining projects often encroach upon natural resources areas, such as forests and wetlands, and hence the ecological impacts should be carefully evaluated. The impacts may be caused directly by the project as well as trough induction by subsequent uncontrolled encroachment by the directly affected population searching in compensation for socio-economic losses, for substitute farmlands, firewood, game, or even illegal op
may destroy rich fishery reproduction areas as well as habitat for waterfowl and other wildlife.

Changes in the hydrology of the site and waterways intercepted by the project can result in creating or increasing local flooding problems and affecting aquatic ecology including fishery. The flow and quality of groundwater may be disrupted.

The major sources of sediment (erosion) in mining operations are the areas being cleared (especially steep slopes), improperly placed or protected salvaged or stockpiled material, surface that impede infiltration or concentrate runoff (bulldozer cleat marks up and down slopes). Roadways are also often the major source of sediment, and many functions as conduits for sediment washing into the natural drainage system. The roads within the mining area itself may cause this as well as access roads to the site. Long access roads can also adversely affect the natural drainage system by intercepting, concentrating and diverting runoff.

Other potential impacts related to the construction stage include:

- impacts on surface water and ground water quality caused by spills of oil and other chemicals, or dumping of construction spoils,
- air pollution (dust, fumes, gas, exhaust),
- noise and vibration,
- solid waste,
- visual impacts,
- changes in land use and income distribution,
- changes in human settlement patterns, population structure and population dynamics,
- social and cultural conflicts due to the differences in customs of immigrated workers and local population,
- social problems caused by displacement and resettlement of populations,
- occupational and public health problems, and safety problems (accidents, exposure to hazardous material, transmission of insect vector diseases and other communicable diseases to workers and/or resident populations),
- disturbance to local traffic,
- encroachment on archaeological and historical resources and cultural and recreational sites.

Operational phase:

The importance of the impact of surface g depends on many factors, including the topographic features of the mined lands, the amount of rainfall in the area, the specific mining technique employed and the chemical characteristics of the deposit and waste products.

Several techniques of SURFACE MINING are practices, depending on the deposit. Sand and gravel are removed from small pits,

- while limestone, granite and marble, for example, are taken from quarries.
- Metallic ores (e.g. copper and iron) are removed from open pit mines, which are huge, deep, gaping excavations.
- In hydraulic mining powerful jets of water remove the overburden, soil and vegetation, and wash out the deposit. Then a considerable amount of sediment is washed into nearby drainage ways.
- Dredging can be used for instance in streambed and seabed sand and gravel deposits.
- There are two basic types of strip mining used to extract e.g. coal, phosphate rock and gypsum deposits:
- area strip mining, which is carried out in flat terrain, and
- contour strip mining in which a series of shelves or benches are cut into the steep flanks of a mountain.

UNDERGROUND MINING

Operations generally create a system of subsurface shafts, tunnels and rooms by drilling and blasting the rock. Certain soluble minerals (e.g. potash and salts) can be removed from the subsurface by solution mining, where water is pumped down an injection well to the deposit to dissolve the minerals. One major problem then is the risk of contaminating groundwater reservoirs.

The main activities of the operational phases of a mining project may involve:

- energy producing operations,
- water supply,
- mining operations, such as crushing, pre-screening, drying, milling, washing, conveying, grading, sorting, storing, loading etc.
- mineral processing operations,
- transportation,
- spoil disposal,
- waste water treatment and discharge,
- workers housing and services

The brief repeal of the major risks and eventual impacts provided below, concerns the particulars of the sector only. Project planning and EIA should additionally and duly consider all and any other implication and incidence of connected sub-activities and services (such as e.g. human settlements and facilities, transportation).

EROSION AND SEDIMENTATION

Accelerated on-site and off-site erosion will continue during the operation stage and also after the mine ceases operation, if measures are not taken to permanently stabilise exposed surfaces with vegetation and/or other erosion control methods.
The accumulating spoil has also a large potential for causing off-site sediment damage. The lack of nutrients and excessive stoniness in waste piles often inhibit the establishment of potentially stabilising vegetation. In addition to rapid erosion, dangerous sliding may occur on these piles. Water pumped from the mine can also contribute to extra sedimentation.

Contour strip mining on steep or mountainous terrain has the largest potential for erosion and sediment damage. Unstable slopes create a potential risk of accidents caused by landslides.

AIR POLLUTION

The main air pollution problem in mining projects is dust. Particulate matter can be emitted from several handling and shipment activities of the ore minerals, mineral processing operations, transportation and spoil heaps. The effects of pollution emission depend upon topography, weather conditions, elevation of discharge points, location, control technology, the raw material processed and other variables.

The dust pollution may have significant impacts on vegetation, soil, equipment, visibility, and most importantly, on human health. In addition to the respiratory problems commonly caused by dust pollution, the particulate from mining process may include radioactive substance (e.g. Radon) and thus potentially increase the risk of cancer.

There are various methods available to prevent or minimise dust emission. These include the use of cyclones, filters and other pollution control technologies, greenbelts, water sprays, enclosure of equipment, paving of roads, etc.
In underground mining, dusts and gas (e.g. methane) may cause problems.
Effective ventilation should be used to reduce gas concentrations to levels below the flammable or toxic limits, and thus the possibility of underground explosions can be avoided.

WATER POLLUTION

In addition to increased sedimentation due to increased erosion and soil material in waste water, the ground and surface water quality can be significantly affected by acid or toxic mine drainage waters and hazardous substances (e.g. heavy metals) leaching from spoil disposal sites. Also the tailings from material processing (ore concentration) may contain toxic elements. At the low pH values level, heavy metals (such as iron, manganese, aluminium, cadmium, mercury, copper, zinc and lead) are more soluble and can create serious water pollution problems. Determination of pH, acid-base balance and heavy metals on the different geologic formations will help identify potential problem strata, and an overburden analysis will allow for a more accurate prediction of the spoil characteristics.

OTHER

Other potential impacts of mining operations include:

- noxious fumes derived from use of explosives,
- noise from blasting operations, machinery and traffic,
- nuisance to local traffic,
- water and soil pollution caused by repair area wastes (oils) and sanitary wastes,
- reduced water supply,
- ecological impacts through air and water pollution and other disturbance (and subsequent socio-economic impacts, e.g. on human settlements and services, agricultural activities, fisheries, game management etc),
- human hazards presented within the mine and associated with slides, overburden piles or tailings etc.,
- aesthetic destruction,
- ground subsidence,
- social and economic impacts on affected economies and social systems, e.g. displacing a long-standing activity by substitution.

Land reclamation and site restoration:

The lifetime of any mining and mine project is limited. However, some of the impacts of mining (e.g. erosion, aesthetic and land use impacts) will continue after
the mine ceases operations; that is if the site is not restored and lands are not returned to natural conditions or conditions capable of supporting prior land uses that are c
value than prior land use.

After mining has been completed, all acid and toxic material must be backfilled and graded. Highwalls and spoil piles must be eliminated, and the approximate original contour be restored. All surface areas must be stabilised and protected in order to control slides, erosion, subsidence and accompanying water pollution and human hazards. Mining wastes or rubbish must be properly decontaminated (radio-active gas!) and disposed.

The land reclamation should be started as soon as possible after the opening of the mine. Therefore, the overall project planning must include land reclamation operations, including sufficient budget allocations. The basic geological and ecological information, including of the principal vegetation associations and the chemical and biological characteristics of water courses, *wadi* beds, and wetlands, which must be collected prior to the project implementation, will be an asset in the re-establishment of natural or agricultural ecosystems (for example) on the site once mining has been completed.

PART II

Environmental Impact Assessment
EI-STATEMENT
Orientation and Guidelines

SECTION I

CHAPTER 1
The presentation Of the proponent

of theShall be presented under this first chapter, **the proponent**
full name and function, his situation of responsibility for the activity subject matter of the EI-Statement, his full address, telephone and other communication links.

Equally shall be made known, the specialist entrusted with the elaboration of the EIA and EI-Statement, by indication of his name, function full address, telephone and other communication links.

Evidence shall be provided of his sound professional qualification for the specific study undertaking, and for his status of independence.

CHAPTER 2
Summary Information

Summary -Statement to the decision-maker:

- the planned activity subject matter of the present EIA and connected statement, and its justification;
- its aims and purpose;

- the major impacts it may have on the environment, and the alterations it may generate to the various environmental compartments and biotopes, as well as the condition of the environment
- the comparison of the impact with established norms and standards.

Equally, the Summary informs and presents the planned mitigation measures and the residual impact. The ctivity, the EI-Statement may, if applicable, indicate the positive impacts originating from the activity and beneficial to the social and economic development of the country, a region or a selected area or community.

Thus, the Summary Information shall be concise, clear in its structure and expression, well referenced and without ambiguity and polemics.

CHAPTER 3

Legal and institutional setting of the EI-Statement, and of the activity

All legal references shall be indicated, that apply to the planned activity, to its implementation, and to the present EI-Statement.

Such references shall include all particular laws, By-laws, codes and regulations that govern the implementation and operations of the planned activity as well as eventual particular conditions and/or characteristics of the activity or the implementation site / environment, and, in given cases, international law, conventions and declarations pertaining to environment protection, to restricted or proscribed activities, areas, material and the like.

The chapter shall as well include information about eventual special conditions issued by financing organisations (regional / international) or international co-operation and pertaining to norms and standards in general or in particular: to EIA.

SECTION II

CHAPTER 4

Presentation and detailed description of the planned activity

The activity shall be described in detail, - in a concise language and simple and comprehensive expression, and in an oriented manner:
inform all and any EIA related data, conditions and details, avoid non pertinent technical description.

It shall be included in the present chapter, description of all elements, structures, infrastructure, spatial provision and improvements, processing, action and function of the activity, that may imply an articulation or impact whatsoever and/or how so ever, on the various and different elements and/or compartments of the environment of the implementation site or zones contiguous to it.

The present subject project activity to be described, consists of all and any element pertaining to:

- Site preparation
- Implementation
- Operations, and
- Dismantling / land reclamation and site restoration,

and consequently shall be included in the EI-Statement under the present chapter, the following sub-activities (at a minimum): land clearing, surface excavation, construction of access roads and/or railways, construction of transmission lines and pipes, construction of offices, laboratories and other buildings,

barriers and fences, blasting and drilling activities, transportation, material storage, housing and other services and connected utilities for labour force (e.g. waste man
migration / resettlement of resident populations, energy producing operations, mine water supply, mining operations, (*mineral processing operations*), spoil disposal, mine waste water treatment, - recycling, re-
zards, etc.

The description shall be supported by maps and photographical illustration, plans, schematic drawings etc., all at appropriate scales, and such as to clearly identify the site and situation of the activity, its dimensions and its general aspects.

CHAPTER 5
Alternative solutions, and justification of the final option

The justification of the project refers to its aims and objectives, bases upon its technical principles, the study approach to identify maximum efficiency, and sustainability.
Such approach implies references to the various alternative solutions that have been investigated, and to the criteria applied for selecting the final solution subject matter of the present EI-Statement.

Thus, the present chapter shall concentrate as a minimum at:

- a brief presentation of the present condition of the very sector field of activities, its functioning and/or deficiencies, major challenges, needs and/or demands,
- the approach of the planned activity aiming at responding to an opportunity or need emanating from the present condition of the sector and its role for development,
- the principal design criteria for the identification of the most efficient solution in terms of technology, economy, social benefits and environmental compatibility,
- the various solutions investigated and developed prior to final option of the present solution,
- the selection of the criteria applied for the evaluation of the various alternative solutions, and
- the justification of the final selection.

It is important that such justification includes all of the various aspects of the activity in its global setting, - technically, economically, socially and environmentally, and that it incorporates the entire activity undertaking from site selection and acquisition trough implementation, operational phase, land reclamation and final restoration of the abandoned site and its environment.

CHAPTER 6
The Potential Impact Area

The Potential Impact Area incorporates all and any of the space related dimensions exposed to pollution risks or significant impact emanating from the activity, - directly or indirectly.
Consequently, it shall include the implementation site and its surroundings, the latter to be dimensioned in function of its various exposures to the different types and nature of risks; the delimitation of the air space risk areas shall always be the projection of the latter on the ground level.

As the validity of the entire EI-Statement depends on the pertinence of the impact study area, the importance of its delimitation as well as its implication on the study rationale and economics are evident.

It is however, that direct impacts induce rather often indirect reaction within the synergetic compound of an ecosystem that can hardly be foreseen without in-depth study and analyses of the condition of the environment and the importance and characteristics of a given impact.

Consequently, it is suggested to opt for a two-step approach for defining the potential impact area:

Step 1:define at the initial study stage, a preliminary area limit incorporating the propagation lines and areas of the various emanations and significant impacts likely to be generated by the activity. Thus, this initial delimitation designs an envelope of a series of specific impact sub-areas.

Step 2: With the ongoing study work on the analyses of the present condition of the environment, its par etween
the various environmental compartments and site specific particulars as well as with the in-

creasing knowledge and experience resulting from the impact analyses and assessment,
an adjustment of the potential impact area may become necessary that implies consequent adjustment, and eventually complementary study work regarding the environmental implications over-covered or not covered by the initial delimitation. (see also Annex 2)

CHAPTER 7
The Time Horizon of the activity

The time horizon aimed at by an activity, or by a project, is important and decisive for successful EIA and pertaining Statements, evaluation and approval; successful EIA being conditioned by its application to the entire and integral time span and horizon of an activity:

> pre-implementation phase,
site acquisition, and preparation of the site and its surroundings (provisional access ways, material storage, workers housing),
> construction phase,
pre-extraction works, annex facilities, infrastruc
> start -up and operations phase,
> planned or probable extension phase of the mining and quarrying activities, the annex facilities and/or the related infrastructure improvements;
> closing down and dismantling phase,
> and reclamation and final restoration phase of the site and its environment.

The impacts may vary from phase to phase, - as it regards their type, nature and importance, and an accumulation of negative impacts is not to be excluded!

Consequently, it is an important requirement (and task of the EIA) that the EI-Statement includes a clear description of the state of the environment before the implementation of the activity, as well as evolution forecast through the entire lifetime of the activity for the case of evolution without the event of the activity.

The appreciation of the final environmental statement and balance shall strongly depend on the comparison of the two evolution scenarios: without activity with activity.

CHAPTER 8
Description of the environment

The accurate identification and correct assessment, evaluation and appreciation (by the decision-maker) of the impact originating from the activity, will strongly de-pend on a qualified and thorough description and analyses of the state of the environment concerned.

It is therefore of outstanding importance, to carry out this part of the study with utmost care, in-depth and application, and to present the relevant findings in a most transparent and comprehensive language and format.
Such presentation shall be supported by pertinent illus
demonstrational material, and all and any references and sources shall be clearly indicated.

Voluminous source and reference material may be submitted to the authority in an annex document to the present EI-Statement.

The following information concerning the structure and contents of the present chapter, is indicated as guidance only, and it is not exhaustive.

The chapter to contain presentation of :

the physical environment

the natural site conditions such as the topography, hydrography, hydro-geology, climatology and air quality, erosion level and soil qualities, raw material and energy resources, the noise and vibration level

the biological environment

the fauna and flora, including of the important wildlife habitats, protected / endangered species, unique or rare ecosystems, forest and fishery re

the human environment

the resident population, their demographic, socio-economic and social condition and trends, existing facilities (education, health, civic), prevailing occupations, socio-professional strata and income level,

areas of unique or exceptional ecological or aesthetic quality and values,
important recreational, cultural or historical ar

SECTION III

CHAPTER 9
Identification and analysis of the various impacts

The subject matter of the present chapter addresses three distinct study activities:

- identify the significant impacts,
- analyse and quantify the impact,

- assess the environmental compatibility (by comparison to established norms and standards e.g.)

The identification shall be undertaken in a systematic way and approach in order to ascertain entirety.

The analysis and quantification shall be based upon recognised methods, qualified specialist support (licensed laboratories e.g.), and be documented in a most transparent format (annex to the EI-Statement: laboratory reports, tests and evaluation methods and formula, resource literature, documents, persons).

The environmental compatibility shall refer to established national norms and standards, and only in the absence of those, comparison to international norms shall be applied. In the latter case, at least three different norms shall be indicated, including

- one of a European industrialised country and
- one other from a country with most similar environmental conditions to those prevailing in Jordan.

The choice of the finally selected norm of reference for the present EIA, shall be clearly indicated and justified.

It is important to note, that the significant impacts on the environment to be identified include those that

accidentally.

The source of the impacts may be direct or induced (indirect), - in first or subsequent generation, immediate or timely retarded.

The most reliable, transparent and justified method for impact identification being the crossing of the various single elements of the activity (chapter 4) with the various single elements of the environment (chapter 8), a matrix method (see example in the annex hereto) may be applied.

The same matrix could be used for synoptic indication of the environmental compatibility, reveal clearly the eventually required measures for the reduction of

impacts, and finally justify an ultimate matrix informing summarily the environmental balance values to the decision-maker.

CHAPTER 10
Mitigation measures

Mitigation measures shall be applied wherever harmful impact constitutes a risk for healthy environment. Those measures shall lead to avoid, to reduce or to compensate negative impacts.
There exist three different types of mitigation measures and the proponent or his independent consultant for the EI-Statement shall not confound them:

Measures to attenuate (or to avoid) an impact consist of a technical or organisational complementary arrangement, implemented by their owner on his own account, and as part of his activity and obligation, and for the only reason: to protect the environment against the risk of damages eventually caused by his activity, - throughout its entire lifetime;

Compensation measures for environmental damages that will be caused by the activity, and to be entirely born by the owner. Such measure may be applicable to cases, where the residual impacts remain important (even after application of attenuating measures), but where the particular nature of the environmental alterations allow for an equivalent compensation: within the impact area of the activity, - outside the latter or even - outside the contextual frame of the project (e.g. resettlement, replanting of trees). It shall however be noted that such type of mitigation measure shall only be considered by the decision maker in cases, where the positive impacts of the activity on the sustainable development of the region are felt important by the authority.

Attenuating measures as described here above, but that shall be born and undertaken by third.

This type of measure shall apply to cases, where one or several impacts, direct or indirect, are generated by the activity, but cannot be charged to it (example: heavy traffic increase du to massive job creation through the activity, and traffic overload on a distant road interchange). In such case, the required adjustment of the public infrastructure to the dynamics of the socio-economic development shall not be charged to the account of the activity, but be born by third budgets.

In order to assist in identifying possible mitigation measures / practices, some examples are listed hereafter:

- use of low-waste and low-pollution technology,
- air pollution abatement measures (e.g. dust control and protection),
- waste water treatment,
- water recycling and conservation,
- energy conservation,
- noise abatement measures,
- solid waste management (especially recycling),
- training and education of workers and general public,
- workers safety measures,
- contingency plans, training and equipment,
- medical and other social services development,
- safe storage facilities for hazardous materials,
- resettlement plans (and proper execution of such plans),
- compensatory measures,
- land reclamation and restoration,
- erosion control and soil conservation,
- regulation of heavy traffic,
- protection unique / valuable habitats, endangered species, cultural, religious, historical, archaeological and recreational sites.

CHAPTER 11
Summary estimation of the Financial implications

For all cases of the three types of mitigation measures as indicated in the previous chapter, the financial implication of the proposed arrangement shall be summarily estimated, and indicated at the cost rates and values as current at the time of the submission of the present EI-Statement for evaluation and approval.

SECTION IV

CHAPTER 12
Final balance and environmental statement

The present chapter shall be introduced by a brief reiteration to the key elements of the EIA, and to the various results, findings and conclusions.

Thus, it shall be summarily recalled:

the initial condition of the site and the environment, with an emphasis on the particular sensitivities;
the main action of the project (throughout all the phases of its lifetime),
the negative impacts, indicated in decreasing order of their importance, esidual impacts, and the firm engagement of the
owner regarding the implementation on his account, of all of the proposed mitigation measures and of the measures for final land reclamation and restoration of the site and the environment;
the positive impacts (social benefits, economic ad

Regarding the environmental balance:

counterbalance positive and negative impacts. Such approach is not possible, as till date, no common scale exists allowing, - for the benefit of sustainable development -, for accounting in a unified approach, impacts on the physical environment e.g. and impacts on the socio-economic or cultural human environment!

It is however important, that the proponent shall try to expose in a very clear and transparent manner, the positive attainments and results to be expected from the planned activity (during and after lifetime) on sustainable develop rm of the various negative impacts, - damages to the environment.

Such demonstration may be accompanied by a matrix similar to the format as exhibited in chapter 9 here above.
In this same present chapter, and in form of a general conclusion, the proponent may propose and bring to the attention of the technical evaluation staff of the authority, and of the decision maker, his own final appreciation of the impact and environmental compatibility, accompanied by due and plausible justification.

SECTION V

CHAPTER 13
The maintenance management

As environmental monitoring and control of the entire activity and of its emissions and other implications on the environment are necessary and binding obligation, the authority requires from the proponent of the present EI-Statement, a comprehensive maintenance and environmental monitoring plan.

The authority shall evaluate this planning document and approve in conjunction with the EI-Statement.

This plan shall contain (not exhaustive example):

- the plan for the monitoring of the environment during the implementation phase of the activity,
- the periodical control of the condition of the environment and its different and various compartments, within and around the project area, and during the operations phase, the dismantling and restoration of the site and the environment;
- the monitoring and control of all liquid waste, surface water and underground waters, sampling, analyses and counter analyses to be undertaken by qualified and licensed laboratories;
- the permanent monitoring and control of the air quality within and around the project area, sampling, analyses and counter analyses by application of certified measuring methods and instruments;
- permanent training of the owners professional staff in the fields of environmental protection and prevention of eventual negative impacts;
- the permanent adjustment of base data for the environmental compatibility of the activity, and in particular of those not available during the study and planning phase (e.g. pluri-annua

CHAPTER 14
ANNEX

In the annex to the present EI-Statement, shall be submitted all and any additional and detail information that may be instrumental and useful for the authority, to verify the multiple information and data, analyses and conclusions, and in particular but not exclusively:

- all reference documents and data, additional information and sources, analyses reports, reports of drilling campaigns and surveys, maps, photographs, photo-interpretation etc. such as referenced in the present EI-Statement;
- simulation out-prints and modelling results,

bibliographical references (publications, documents, studies, research reports etc)

By law No () of 1999
Environment Impact Assessment
Issued pursuant to Law for Environmental Protection
No 12 of 1995, articles 15 & 34

ARTICLE 1: This By- -

Gazette.

ARTICLE 2: Whenever used in this By-law, the following terms and expressions shall have the meaning thereto assigned herein below, unless the context otherwise requires:

Environment Impact Assessment:

Is the study undertaken pertaining to identification and evaluation of the effects likely to be generated by any project on the natural environment, encompassing all of its elements, and the extent to which the project may impact or be impacted on, by the social and economical aspects; the process shall also include identification of the mitigation measures to avoid or reduce any negative impacts on the natural environment, to achieve sustainable development.

Environment Impact Statement (EIS):

The report presented by the proponent to the corporation, which contains a summary of the state of the environment and the outcome of the process of environmental impact assessment.

Project: Indicates any new activity or program or action likely to have an impact on the environment and sustainable development, including any extension or modification to any existing project.

Proponent: Indicates the legal person, whether from the private or public sector, in whose name the project is submitted to the corporation for approval prior to its implementation.

ARTICLE 3:a. The By-law shall apply to each and any of the industrial, agricultural commercial, construction, housing and other projects and those services connected with, according to the lists issued by the corporation for this purpose, and its amendments.

b. The Corporation has the right to require the proponent to prepare and submit the Environmental Impact Assessment to any project not included in the lists mentioned in (a) above.

ARTICLE 4: The Directorate shall establish the necessary environmental guidelines and forms required for the study and evaluation and discussion of the submitted alternatives to the project, taking into consideration the environmental interests of all governmental and non-governmental sectors concerned in the light of the study and assessment, noting that all parties shall abide by the guidelines under the stake of responsibility.

ARTICLE 5: The proponent shall submit the terms of reference for conducting the Environmental Impact Assessment for approval by the directorate before carrying out the study and assessment.

V.
VI. The Directorate shall have the right to refuse, modify or add what it may consider suitable.

Article 6: The Directorate is the concerned party for reviewing the EIS, and it shall decide the non-requirement for submitting this document. The Director General shall form specialized technical committees for each project individually.

ARTICLE 7: No permit of any kind shall be issued to any project, until all licensing requirements are met, including acquiring the EIS according to the requirements and conditions issued by the corporation.

ARTICLE 8: All parties to whom this By-law apply, shall conduct the research study and analysis required for the EIS.

ARTICLE 9: The Director General shall issue his decision, in writing, either approval of the EIS, or its modification, or refusal within a period not to exceed 45 days from the date of submission.

ARTICLE 10: The proponent shall have the right to appeal the decision regarding the EIS to the council within (15) days from the date of decision.

The decision of the council in this regard shall be final.

ARTICLE 11: The Corporation shall conduct control and periodic inspection of the projects included under the provisions of this By-law, to insure adherence to the conditions contained in the EIS document.

ARTICLE 12: Any violator of the provisions of this By-law shall be fined according to the penalties contained in the law for Environmental Protection No (12) of 1995.

ARTICLE 13: The Council, the Director General and the Directorate are entrusted in the implementation of the provisions of this By-law, including the preparation of data, forms and annexes for fulfilling its objectives.

ARTICLE 14: This By-law shall repeal any legal provisions not consistent with the present provision.