



**Ministry of Local Administration and Environment
The General Authority of Environmental Affairs
UNDP/GEF**

**Self Assessment of National Capacity Building Needs in Syria to Manage
Global Environmental Issues
(NCSA-SYR/05/012)**

**Stakeholders Analysis
Climate Change in Syria**

July 2006

**The General Commission for Environmental Affairs, Mazraa, Damascus Telefax +963 11
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**Prepared by
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**Self Assessment of National Capacity Building Needs in Syria to Manage
Global Environmental Issues
(NCSA-SYR/05/012)**

Goals

To Assist the Syrian Government and the national stakeholders to:

- 1- Assess the capacity constraints and potentials for implementing the three UN Conventions on Biodiversity, Desertification and Climate Change.**
- 2- Assess crosscutting issues among the three Conventions to complement and enhance linkages and integration.**
- 3- Promote resource mobilization and coordination in implementation.**

Output

Develop a Strategy and an Action National Plan for capacity development in implementing the three UN Conventions and the synergies among them.

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Analysis of Stakeholders Activities

CLIMATE CHANGE

SUMMARY

Change in the Earth's climate and its adverse effects are a common concern of humankind, a concern that human activities have been substantially increasing the atmospheric concentrations of greenhouse gases, that enhance the natural greenhouse effect, and that this will result additional warming of the Earth's surface and atmosphere and may adversely affect natural ecosystems and humankind. The global nature of climate change calls for the widest possible cooperation by all countries through participating in an effective and appropriate international response in accordance with their common but differentiated responsibilities, and respective capabilities and their social and economic conditions,

The ultimate objective of United Nations Frame Convention on Climate Change UNFCCC, which resulted of Earth Summit, Rio, 1992 and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere. The Syrian Arab Republic (SAR) signed and approved this conviction at 1996.

The Convention determined to protect the climate system for present and future generations. Climate of a region is statistical description of such conditions, in a given region, over a specified period long enough to be representative. Climate change means a change of climate, which attributed directly or indirectly to human activity. Adverse effects of climate change means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare.

The responsibility for dealing with the main environmental issues in Syria lies within a number of ministries, in addition to the Ministry of Local Administration and Environment. A technical consultative committee and a number of secondary technical committees assist the Ministry of Local

Administration and Environment, which operates through the following executive agencies:

1. The General Council for Environmental Affairs (GCEA), which is the technical agency,
2. The Scientific and Environmental Research Center (SERC), which is the research agency, Syria prepared the National Environmental Strategy and Action Plan. Adapted many procedures insisted of Increase the competence of transportation sector. Increase the competence of energy use of trade and house sector, enhance the use of gas in industrial sector, and updated the petroleum strainers to produce high quality fuel. It is useful to maintain that Syria does not produce any controlled substances under the Montreal Protocol. In addition, energy sector had developed in using gas instead of fossil fuel in energy producing, and reduce CO₂ emission.

All stakeholders of Environmental and Climate Change have their activities aim to reduce Climate change effects, and each one of them has his one activity in Environmental capacity building. Specially GCEA, and ESRC, and General Meteorological Department, and others,

Most work constraints in the field of UNFCCC can conclude as follows:

- 1– Scarcity of projects and researches about climate change, and interaction impact of human activities and climate change,
- 2 - Scarcity of local financing of projects, and the difficulties of finding another financing,
- 3 - That needs better cooperation between stakeholders,
- 4 – Non- existence of sufficient database about climate change, and the difficulties to get at available information,

Therefore, that it is necessarily to:

- 1 – Enhance meteorological department technically and financially, to make procedures to update the database and climate information, and Syrian Climate Atlas, and Agriculture Climatic Reference, and Syrian Wind Atlas, Solar Radiation atlas. In addition, to form a technical grope to study the expected greenhouse effects on the Syrian climate, and predict what climate could be in the coming decades, and until 2100.
- 2 – Enhance all sectors responsible of greenhouse gases emissions in Syria, to update researches of reducing the emissions.
- 3 - Enhance all sectors, which will take procedures to reduce greenhouse gases emissions in Syria.
- 4 - Enhance all sectors that may effect because of climate change, to face that.

BACKGROUND

Change in the Earth's climate and its adverse effects are a common concern of humankind, and a concern that human activities have been substantially increasing the atmospheric concentrations of greenhouse gases, that enhance the natural greenhouse effect, and that this will result additional warming of the Earth's surface and atmosphere and may adversely affect natural ecosystems and humankind. The largest share of historical and current global emissions of greenhouse gases has originated in developed countries, that per capita emissions in developing countries are still relatively low and that the share of global emissions originating in developing countries will grow to meet their social and development needs. There is an awareness of the role and importance in terrestrial and marine ecosystems of sinks and reservoirs of greenhouse gases. There are many uncertainties in predictions of climate change, particularly with regard to the timing, magnitude and regional patterns thereof. The global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiate responsibilities, and respective capabilities and their social and economic conditions. All states have "in accordance with the Charter of the United Nations and the principles of international law" the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies. In addition, the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States, Or of areas beyond the limits of national jurisdiction, Taking into consideration the principle of sovereignty of States in international cooperation to address climate change. And states should enact effective environmental legislation, that environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply, and that standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.

United Nations Frame Convention on Climate Change UNFCCC

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieve within a period sufficient to allow ecosystems to adapt naturally to

climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

The Syrian Arab Republic signed and ratified this convention during 1996.

The Convention determined to protect the climate system for present and future generations, involved

1. Introduction – indicate to evidences about the relationships between anthropogenic greenhouse gases emissions and climate change, and due to hold, many international conferences call to ratify an international convention to face this problem.

2. 26 articles about all the important sides of this convention, the most important article was article number (4) (commitments). All Parties, taking into account their common but differentiated responsibilities. And their specific national and regional development priorities, objectives and circumstances, shall : Formulate, implement, publish and regularly update national and, where appropriate, regional programs containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change. (Annex 2).

RATIONAL

What is Climate? Climate of a region is statistical description of such conditions, in a given region, over a specified period of time long enough to be representative usually a number of decades . Many factors influence climate at any area, the distance to the equator or pole, the height of that area above sea level, the distance to seas. Climate has the main role of environment at any area, as planets and animals adapted with the climate in their area.

Climate change means a change of climate, which is attribute directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable times. Adverse effects of climate change means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare. All states should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.

Since the last decades of the twentieth century, Climate Change, or Global Warming, or Greenhouse effects, is the most important problem in the world, that it influences the life on the Earth. As the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiated responsibilities and respective capabilities and their social and economic conditions.

Climate Change is not new, it happened in the past, but the speed of change during the last few years made the scientific authorities believe that the change could happen faster and faster during the coming years, with a very active destroyable energy to the existence environmental systems. Several scenarios have used to assess the potential impacts of climate change. Built on: Scientific researches, eyewitnesses, mathematical modeling, due what happened in some old times, like destroying a lot of forests and another environmental systems, and exterminated thousands kinds of living beings. Climate change was the main reason to disappear of some old civilizations, because of reverses and water resources drought, destroy agricultural lands and desertification, and destroy the ability of food product. Due to the scientists information about mean temperatures from 1861 to 2000, made clear that the mean temperature increases all over the world. The mean temperature now is 15.3 degrees centigrade, rising of about (0.2 - 0.6) degrees centigrade, from 1861, as mentioned by intergovernmental panel on climate change (IPCC) 2003, and continue this temperature rising, and mentioned the high temperatures were during (1995,1998,2002 and 2003) respectively. To speak about climate change it is necessary to mention two important factors, influence this change:

1 - Greenhouse Effects

Since its formation, the atmosphere has been subjected to continuous variations concerning its composition, temperature, capacity of self-cleaning or its role in preserving the ecological balance. These variations are sometimes of natural origin (i.e., forest fires, volcanoes, or floods) or anthropogenic (i.e., fabricated). The atmosphere is influence by gaseous emissions resulting from human activities like energy generation, industry, or agriculture and by deforestation operations, (which brings down the consumption of CO₂). Indeed, these activities introduce direct changes in the complicated mixture of gases forming the atmosphere. The concentrations of greenhouse gases have been increasing since the beginning of the industrial revolution

Many scientists have observed that the augmentation of CO₂, methane, nitrous oxide concentrations have a direct influence on the rise of the average temperature of the earth. Before industrialization, the atmosphere was present in

a natural state of balance between various gases forming the atmosphere. The natural effects of these gases allow the earth to preserve an average temperature of $(15.5)^{\circ}\text{C}$ (thanks to their control on the balance between the sunrays entering the earth atmosphere and those reflected by the earth surface out to the outer space. The increase in the concentration of greenhouse gases causes the rise of the average temperature of the earth by trapping the reflected sunrays inside the earth atmosphere. This phenomenon called the anthropogenic greenhouse effect. Industrial countries are largely responsible for the augmentation of GHG concentrations due to their higher industrial activities and hence, though the observed fast development of developing countries is contributing to this augmentation. That is why it is necessary to maintain a good level of international co-operation especially that more than 5 billion people are sharing one planet and have common responsibilities to preserve the ecological equilibrium of our planet earth and its atmosphere.

Indeed, the atmospheric concentration of CO_2 has increased during the last century from 258 ppm to 340 ppm and it expected that this level would double by the end of this century if emissions of this gas continue to increase. This augmentation will cause the rise of the average temperature by about $(2.5)^{\circ}\text{C}$.

1.1 Trace gases and their effects

Greenhouse gases have various effects on the environment. Table (1) shows the environmental effects of the different trace gases present in the atmosphere. These gases can classified to “direct” or “indirect” according to their effect, as follows:

- Greenhouse gases of direct effect: CO_2 , CH_4 and N_2O , Are gases that have direct effects by blocking reflected thermal rays from escaping to the outer space.
- Greenhouse gases of indirect effect: NO_x , CO and NMVOC , Are gases, which participate in the formation of ground level ozone in the atmosphere, which in turn, contributes to the greenhouse effect.
- Sulphur Dioxide (SO_2): The percentage of SO_2 in the atmosphere is at sub-ppm levels, nevertheless, SO_2 along with NO_x are mainly responsible for the formation of acid rain and the corrosion phenomena.
- Chlorofluorohydrocarbon compounds (CFCs): Are composed of chlorine, fluorine, carbon and hydrogen. The percentage of this type of compounds in the atmosphere dose not usually exceeds 1 ppb, though they play a major role in the depletion the ozone layer in the stratosphere (10 - 50 km from earth surface).
- Hydroxyl radical (OH): The OH radical is very reactive species in the urban atmosphere and is mainly responsible for transformation or photochemical oxidation of organic compounds in the atmosphere.

Its concentration in the atmosphere is very low (~ 0.0001 ppb). In addition, expected to decrease in the future,

- Soot: The incomplete combustion of diesel fuels produces carbonaceous particles known as “soot”. Since soot is mainly composed of elemental carbon

(EC) and adsorbed organic compounds, they can trap reflected infrared rays from earth surface.

- Suspended particulate matter (SPM): These are particles present in the atmosphere due to natural sources (blown dust and soil erosion) or due to anthropogenic emissions of fine particulate matter. The higher the organic content of SPM, the higher their contribution in trapping the reflected sunrays from ground surface.

Table (2) lists some GHG developed ratio in the atmosphere, which have relatively long lifetime in the atmosphere. It also shows that the concentrations of NO_x and SO_2 gases will not increase during the next 40 years in the industrialized areas but it will rise significantly in the other polluted areas. It should be note that the concentrations of CFCs calculated based on the number of chlorine atoms contained in a molecule.

Scientists have concluded that the huge quantities of CO_2 and other gases resulting from the enormous use of energy have become an important factor in the transformation of the earth to a large greenhouse. When these gases emitted, they form in the troposphere a cover around the earth that allows the sunrays to get in through the atmosphere but they block the reflected infrared rays by the earth's surface to escape to the outer space.

This phenomenon produces a rise of the earth temperature, which known as the greenhouse effect. Moreover, it has been observe that a relation exists between the greenhouse effects and the depletion of stratospheric ozone layer. This relation emphasize by two phenomena:

- 1 - Changes in the ozone layer will affect the climate and wind directions.
- 2 - CFCs gases have an important role in both ozone layer and in greenhouse effect. The role of each unit of these gases is 10 thousand time more important than that of one unit of CO_2 . In the same way, the effect of CH_4 , NO_x or N_2O is twice more important than that of CO_2 . TABLE (3): Estimated global evolution of GHG concentrations in the atmosphere

In conclusion, the following points can resume the consequences of the greenhouse effects:

- Formation of acid rain
- Corrosion
- Smog effect
- Depletion of the ozone layer
- Rapid increase of the earth temperature that will produce:
 - * Rapid damage of coasts and submersion by waters
 - * Rise in fresh water level.
 - * Changes in the nature of agricultural crops
 - * Rise of sea level.
 - * Desertification and starvation
 - * Population drains and new distribution of human settlements

* National tensions because of emigrations from disaster areas (Table 4)
Weather indicators because of temperature increase during twentieth century.

2 - The Depletion of Stratospheric Ozone Layer

Ozone layer is that layer of the atmosphere in which the concentration of ozone is greatest. The term is used both to signify the layer from about (10 to 50) km in which the ozone concentration is appreciable, and to signify the much narrower layer from about (20 to 25) km in which the concentration generally reaches the maximum. The ozone layer absorbs high-energy ultraviolet-B radiation, and transforms it into heat. Reduction in the total ozone column density leads to an increase in the intensity of the harmful ultraviolet-B radiation at the Earth's surface.

The larger part of atmospheric ozone is found in the stratosphere, where it is generated in the process of the photodecomposition of oxygen.

Ozone in the troposphere accounts for approximately one-tenth of the total ozone column. This ozone is mainly produced from hydrocarbons and nitrogen oxides in a photochemical process triggered by "smog" mechanisms.

Tropospheric ozone has serious negative effects (toxic for humans, animals and plants; and aggravation of the greenhouse effect), whereas stratospheric ozone is of vital importance as a filter of ultraviolet radiation.

The concern that resulted in governments signing the 1987 Montreal Protocol, with unusual speed, arises from the realization that man-made substances, called Chlorofluorocarbons (CFCs) and halons, are destroying the ozone layer in the stratosphere. Which are very stable and remain in the troposphere for many decades? However, as they diffuse eventually into the stratosphere, the chlorine they contain is liberated and it catalyses the break-up of ozone. This is known in theory since 1974, but the most dramatic pointer of ozone depletion – the Antarctic ozone "hole" – was first detected in 1985.

As far as the greenhouse gases are concerned, ozone absorbs infrared radiation, as does carbon dioxide, and it therefore contributes directly to the greenhouse effect. In addition, a decrease in total ozone resulting in increased ultraviolet radiation reaching the upper layers of the sea may cause the death of phytoplankton. If this happens, the marine biomass will be less able to absorb the carbon dioxide in the water, and reduce the ocean's effectiveness as a carbon sink, leaving more carbon dioxide free in the atmosphere.

Stakeholder Analysis

Responsibility Evidences of Syria to UNFCCC

Syria had approved UNFCCC in 1996. Therefore, that Syria prepared the National Environmental Strategy and Action Plan. In addition, adapted many procedures insisted on: Increase the competence of transportation sector. In addition, increase the competence of energy use of trade and house sector,

enhance the use of gas in industrial sector, and updated the petroleum strainers to produce high quality fuel. In addition, it is useful to maintain that Syria does not produce any controlled substances under the Montreal Protocol.

In addition, to improve air quality, developed a Policy as follows:

- Adopt policies and projects which contribute to the decrease of green house gases, and to the reduction of pressures on natural resources, particularly in the following areas:
 1. Promote the utilization of natural gas in the generation of electrical energy (Table 5 and 6).
 2. Rehabilitate old energy generation stations in order to increase their efficiency.
 3. Plan for energy use and conservation in order to reduce the technical and commercial losses in the electrical system (Table 7), and (Figures 1–2)
 4. Promote the utilization of renewable energy resources, and particularly the wind.
- Develop urban master plans for cities and municipalities in accordance with international standards, which account for population growth and traffic movement, and provide car-parking areas.

In addition, institutional and legislative development as follows:

- Control technical performance of vehicles, and develop appropriate rules and regulations in accordance with international standards for imports with the aim of preventing pollution.
- Adhere to a regular and annual vehicles inspection system for monitoring exhaust gas emissions, and provide the necessary equipment for this task.
- Complete the plan of supplying gasoline-pumping stations in all Syrian cities with unleaded gasoline (in the implementation phase).
- Provide licenses for new industrial plants only based on environmental impact assessments, and ensure that these establishments will abide by the rules and environmental regulations in order to prevent the emission of air pollutants in the future.
- Establish enforcement patrols to control illegal emissions from vehicles' exhausts, within and outside city limits
- Complete the legislative requirements for the Environmental Law concerning the allowable limits and standards for air emissions.

In addition, establish an integrated air emissions monitoring network, and carry out a national program for monitoring of air pollutants in large cities, and in industrial areas.

In addition, investment programs as follows:

- Improve the environmental standards in the extraction and refining of petroleum products.
- Reduce the gaseous emissions, dust and other particulates to allowable limits (particularly in cement plants and chemical fertilizers industries).
- Reduce demand on vehicular transport; adjust peak periods; and substitute the individual vehicular traffic with an integrated public transport system
- Develop the technical capacities of the petroleum refineries in Homs and Banias in order to produce diesel and gasoline products in conformance with approved international standards.
- Raise the efficiency of energy utilization in industry.
- Develop the vehicular traffic system, and establish a network of bridges, access roads, and tunnels within city limits; solve the problem of cars' parking on access roads, and organize pedestrians' movement.

The responsibility for dealing with the main environmental issues in Syria lies within a number of ministries, in addition to the Ministry of Local Administration and Environment. These ministries bear direct responsibilities for providing the legislative framework or the institutional support necessary for environmental work. In addition, an inter-ministerial body, the Council for the Protection of the Environment and sustainable development, established with the responsibility of setting national policy and coordinating environmental management activities.

A technical consultative committee and a number of secondary technical committees assist the Ministry of Local Administration and Environment, which operates through the General Council for Environmental Affairs (GCEA), which is the technical agency and the Scientific and Environmental Research Center (SERC), which is the research agency.

Activities of the General Council for Environmental Affairs (GCEA)

1– Implications of Expected Climate Change for the Syrian Coast. As a part of "Climate Change and the Mediterranean"

The objective of this study were to examine the possible consequences of rising temperature and sea levels and of change climate for the coastal region of north-west Syria, and to estimate the effects of such changes on natural and managed ecosystems, and on the social conditions, economy and health of population, and accepted as perfect study.

Financing of the study was by cooperation between SAR (GCEA), and UNAPT.

2 – National Environmental Strategy and Action Plan in Syria

Prepared by: (GAEA), in coordination with: The World Bank. Financed by: UNEP – Syria Adopted by: The Council for Environmental Safety,

30 / 4 / 2003 It had considered as one of the best actions, and included many important paragraphs as:

1. Global Environmental

The energy sector in Syria has converted power generation processes from fuel oil to gas, since its ratification of the Climate Change convention in 1996. Which reduced the carbon dioxide emissions? The Syrian government also prepared a National Action Plan, and adopted a number of measures at the policy level to increase energy efficiency, which would ultimately lead to environmental and social benefits.

Finally, it is worth mentioning that the Council for the Protection of the Environment and sustainable development ratified on 13/10/2002, a licensing system to control the import of Ozone Depleting Substances, controlled under the Montreal Protocol.

Under the address State of Environment in Syria;

2. Air Quality

Air pollution is a major problem in highly populated areas in Syria, and is responsible for the contamination of the urban environment with gaseous emissions, suspended particulates, volatile organic chemicals, smog, lead, noise and others. In principle, this problem stems from the country's economic development, rapid industrialization, population growth and related commercial and social activities, particularly the public transport system, and migration from rural areas to urban centers. Air pollution adversely affects public health and work practices. It also affects archeological and cultural heritage sites, and causes the loss of green areas and public parks.

3. Current Status of Air Pollution

A number of scientific institutions (The Scientific Studies and Research Center, Scientific and Environmental Research Center, Atomic Energy Commission), In addition to the Ministry of Local Administration and Environmental have conducted short to medium term air quality monitoring campaigns in a number of cities and industrial areas. With an objective to obtain, an insight the levels of pollutions in the atmosphere However, these campaigns suffered from the fact that collected data did not form a part of continuous systematic long-term monitoring and measurement programs of air pollutants, in cities or in industrial areas. Limited monitoring data collected in large cities indicated that air quality

was very poor and concentrations of air pollutants significantly exceeded the limits set in Syrian standards of air quality.

Daily concentrations of total suspended particulates (TSP) exceed the $120 \mu\text{g}/\text{m}^3$ allowable limit recommended by the World Health Organization (WHO). Daily concentrations varied between $115 - 600 \mu\text{g}/\text{m}^3$ for most Syrian cities.

4. Causes of Air Pollution

Air quality degradation caused by a combination of the following factors:

5. Motor vehicle emissions, particularly the old fleet of cars, and poor traffic management resulting in cars spend a significant amount of time standing idle in queues with their engines running.
6. Industrial emissions from cement plants, quarries, power stations and refineries, (Tables 8 and 9 and Figures 3 and 4)
7. Emissions from domestic heaters, mainly during the four-months of winter period; (Table 10 and figure 5)
8. Layout of city blocks that does not permit the effective circulation of air currents dissipating pollutants and suspended particulates,

The strategy is updating now. Some paragraphs of it are in annex (3).

Many procedures are going on to execute a very important project, by cooperation between SAR (GCEA), and (UNAPT), addressed as:

ENABLING ACTIVATES FOR THE PREPARATION OF Syria's INITIAL NATIONAL COMMUNICATION TO THE UNFCCC

This project will be a continuation of the study mentioned above "Climate Change and Mediterranean" and will cover all the Syrian territories, with the interaction between the climate change and environment.

Activities of Environmental and Scientific Research Center

The Environmental and Scientific Research Center (SERF) executed the country study on Climate Change Due to Greenhouse Gases, in Syria, in cooperation with the German Foundation for Technical Assistance (GHZ); this action is for the implementation of the Syrian commitment to the United Nations Frame Work Convention on Climate Changes. The country study deals with the following main objectives:

- Inventory study about the sources and sinks of greenhouse gases (GHG) emissions in Syria (Phase 1).
- Study of the technical and technological options permitting to reduce the emission GHG – Technological and other options for the mitigation of GHG in Syria (Phase 2).

- Selection and development of the adequate alternatives according to the local sites conditions – Mitigation Analysis (phase 3)
- Definition of a work plan for the implementation of the most adequate and effective alternatives permitting the reduction of greenhouse gases (Phase 3).
- Preparation of the final report including results, proposal for national plan to confirm the aim of this study, to protect the local and global environment, and adjust the energy use, and to decrease Greenhouse emissions, and improve the life quality (Phase 4),

This study executed in cooperation with other stakeholders such as the ministries of electricity, industry, transport, agriculture and petroleum; and Central Bureau of statistics, and Scientific Studies and Research Center, Damascus University, General Meteorological Department. This report consists of (9) chapters.

1 - Main Information about the Syrian Arab Republic

1 – 1- A glance about the political and institutional system in Syria.

1 – 2 - Location, surfaces and borders

1 - 3 - Climate in Syria, the Syrian Arab Republic enjoys a Mediterranean climate. A cold and rainy winter and a hot and dry summer characterize this type of climate. The two main seasons separated by relatively two short transitional seasons: the spring and the autumn.

1 - 4 – Population

2 - The Syrian Environmental Policy

2. 1- General environmental policy, The Syrian environmental policy based on the close cooperation between different sectors of economy and administration, which characterized by the team spirit, These sectors work according to final directives defined by the national strategy that must implemented in a way to be acceptable by all parties also.

1. Taking into account the environmental impacts of developing projects,
2. Developing human society and raising the living standard on healthy environmental bases.
3. Searching for long-term solutions for the general environmental problems
4. Collecting and analyzing main economical and social information that have direct impacts on the environment and development of the Syrian economy.
5. Issuing the necessary legislation, regulations, and pollution Acts for the protection of the Syrian environment.
6. Environmental planning, which ensures the optimal use of national resources in a balanced way towards the population and environment.
7. Setting principles for safety and protection of the environment, this must do by defining the current environmental problems, looking for solutions by participating in scientific studies and research and by reducing the apparition of new problems of environment.

2. 2 Environmental policy of ESRC

This report mentioned some problems threatening human kind, they are:

1. Greenhouse effect;
2. Depletion of the ozone layer;
3. Scarcity of waters and the gradual depletion of groundwater reserves;
4. Shrinking and degradation of forests;
5. Pollution of water, soil, air, foods and plants;
6. Desertification and loss of agricultural soil and green cover;
7. Degradation of the biological varieties;
8. Demographic explosion and many others

The aim of (ESRC) is to perform scientific research in general and environmental fields. The ESRC focuses on the following aspects:

1. To coordinate with other public organizations concerned in scientific and environmental research.
2. To collect and reinforce local and national experiences related to environmental research.
3. To support and develops scientific efforts in the study of national norms compatible with data imposed by local environmental conditions.
4. To monitor Environmental pollution
5. Setting a National Environmental Data Bank
6. Recommend to the Syrian authorities the appropriate methodologies and solutions for environmental problems.

٣ - Economical Development

The Syrian economy has experienced a great development during the last few years. This development affected all sectors of the national economy. In 1963 the GDP was at 23150 million Syrian Pound, whereas in 1990 it reached (268328) million Syrian Pound Since the beginning of the 90s, the Syrian economy has enjoyed a good growth at about 4 % So, in 1994 the GDP reached (506101) million Syrian Pound. In the other hand the total greenhouse emissions was 29 millions equivalent tons of CO₂ in 1990, and expected to reach 63 millions equivalent tons of CO₂ in 2010 .

3. 1 Energy Resources in Syria

As Syria is one of the oil exporter countries, it is self-sufficient in energy sources. Oil considered as the main source of energy followed by the use of natural gas as well. Hydroelectric (Euphrates dam) energy plays an important role in the generation of the required electrical power. Since the beginning of the 1980s, there has been a rising interest for the use of renewable energies like solar and wind ones.

3 – 1 - 1 Classical Energies

The energy resources in Syria depend on oil, and natural gas, and Hydroelectric, and biomass. The oil production developed from about (9) millions m³ in 1980 to

about (33) millions m³ in 1996. Natural gas production developed from about (404) millions m³ in 1980 to about (6034) millions m³ in 1996 (Table 5).

3 - 1 - 2 Renewable energy sources:

- Solar energy, the Syrian Solar energy atlas prepared at the end of 20s century
- Wind energy, (the Syrian wind atlas prepared and published at the end of 20s century in tow languages, Arabic and English).

3.2.2 Fuel in Syria and Consumption Development

Fuel consumption developed from about (4.6) millions tons in 1980 to about (8.3) millions tons in 1996. Natural gas production developed about (4) times during the same period. The annual consumption of diesel oil increases by about 3% per year.

3.2.3 Electrical Energy Production

The electrical energy production developed from about (777) Giga watts/h in 1970 to about (18150) Giga watts/h in 1996. The electrical energy demand expected to reach (44000) k w/h at 2010. (Figure 1 and 2) is the total energy capacity in Syria. It is mentioned that the quantity of fuel needed to produce (1) k w/h in Syria, more than that in industrial countries, so that there is a big chance to reduce greenhouse gases (GHG) emissions in case improving the recovery of electrical stations in Syria . The report mentioned the prices of electrical energy, oil derivatives.

Industrial sector and its energy development, and in many industries as cement, oil and gas, chemical, and others, Transport sector, housing, agriculture and forestry, land use, development of agriculture products, etc.

4 - Calculation of Green House Gases (GHG) Emissions

Greenhouse gases due to human activities influence the atmosphere, the speed of development in developing countries increase the concentration of these gases in the atmosphere. Heavy storms, and hurricanes and climate disasters that increased during last years could indicate the beginning climate change.

Methods employed during this work for the calculation of the emissions of green house gases were according to the IPCC method.

4 - 1 the important influences of deferent gases

The report introduces greenhouse gases and the concentration of each one in the atmosphere (Table 4).

4 - 2 the influences of greenhouse gases

Explain of the influences of greenhouse gases concentrations in the atmosphere, which could cause the increase the temperature of the atmosphere.

5 - Results of Inventory Study

The report included the calculation of the emissions of green house gases were according to the IPCC method.

6 - Greene House Gases Emissions Development – The main scenarios

Information of greenhouse gases emissions development in many sectors.

7 - The main sectors of decreasing Green House Gases Emissions

The economical development in Syria during last years reached 4 %, could cause increase the greenhouse gases emissions, and expected to increase from (39) million equivalent tons of CO₂ in 1990, to (74) million equivalent tons of CO₂ in 2010 . So that fore the treatment of the atmosphere, there is global duty to establish programs and plans aim to decrease the pollution and greenhouse gases emissions, in many sectors as, energy, agriculture, regional planning, etc.

8 - Options of GHG Emissions Reductions

The report mentioned many options in deferent sections, and by the use of renewable energy sources.

9 - Non- technical options (Education and lows)

Financing of the study Was by cooperation between (SERF), and (GTZ).

Annex (4).

Activities of General Meteorological Department

The General Meteorological Department conceder as the official stakeholder to observe, and study the weather and climate in SAR, and prepare information, and reports related to weather and climate, and make researches and scientific studies in this filed, and make this available to all stakeholders and researchers as far as possible .

The Met Department exist a database of all weather elements to all weather stations available in Syria for more than 50 years. Important procedures are going on now to connect most of these weather stations with the central department by a communications net for this aim, via a computer's net. Which make the information available directly and very soon?

The Met Dep issued the Syrian Climate atlas in 1978 and the Agriculture Climate Authority in 1978. Both of them are available, and need updating now.

The Met Dep cooperated with (GAEA) in the study of: Implications of Climate Changes for the Syrian Coast 1992 - 1993. It was the first study to include a good analysis of the interactions influences between climate change and environment in general, especially on the Syrian coast and conceder as a good one. Because of cooperation with other stakeholders, the Met Dep issued the Syrian Wind Atlas in 2000, and prepared the Solar Radiation Atlas in 2000. As a part of a project about renewable energy, both of them need updating.

Activities of Other Stakeholders

All other stakeholders of environment and climate change, and global warming, especially those mentioned in the country study on climate change due to greenhouse gases, and all other stakeholders cooperate in any action to reduce the effect of global worming, and climate change. They have good activities aim to reduce greenhouse effects, and reforestations activities, general cleaning activities.

Activities of Capacity Building

a. National capacity building of environmental affairs project in Syria 1995-2000

This project consisted of two actions as:

- 1 – Prepare a national environmental strategy.
- 2 – Strengthen the institutional and human capacities.

Financing of the project was from UNAPT.

b. National Environmental Strategy and Action Plan in Syria

In the field of capacity building in general we can consider the national environmental strategy and action plan in Syria, as a good action, especially:

1 - Institutional Framework

1- 1- National Level: The Syrian Arab Republic was the first Arab country to establish an independent environment ministry and to incorporate, Environmental aspects into development planning. In addition, an inter-ministerial body, the Council for the Protection of the Environment, established with the responsibility of setting national policy and coordinating environmental management activities. The Ministry of Local Administration and Environment has a regulatory, coordination, and research functions, and is responsible in the field of environment for:

- 1 - Identifying current environmental problems, and participating in research studies for their remedy, in addition to preventing the occurrence of future environmental problems.
- 2 - Stipulating the environmental protection policy, and preparing the necessary national strategy, including action plans and programs for implementation.
- 3 - Utilizing all means and methods to raise public awareness on the importance of protecting the environment, and its resources
- 4 - Measuring and monitoring environmental parameters in laboratories approved by the Council for the Protection of the Environment, through a specific accreditation process.
- 5 - Preparing specifications and allowable limit-standards for the environmental parameters, and establishing the criteria and methodology for conducting environmental impact assessments
- 6 - Undertaking and supporting environmental research studies, and evaluating the environmental risks associated with the use of various types of materials.
- 7 - Monitoring the activities affecting the environment and undertaken by public and private establishments to verify their conformance to the limits set by the environmental standards and specifications.

Constraints

Most work constraints in the field of UNFCCC can be concluded as follows:

1 –Even Syria does not produce any controlled substances under the Montreal Protocol, there is scarcity of projects and researches about climate change, and interaction impacts of human activities and climate change.

2 - Scarcity of local finance of projects, and the difficulties of finding finance

3 - That needs better cooperation between stakeholders.

4 – Non - existence of sufficient database about climate change, and the difficulties to get at available information

Recommendations

Due to stakeholder's activities, we can distinguish three levels:

A. Capacity buildings of meteorological activities, in weather observing, and exist a suitable database, and to make climate researches about present and future climate, and make them available to policy makers, and other stakeholders, it must be done in the meteorological department.

B. Capacity buildings of study of greenhouse gases emissions levels in deferent sectors, and how to reduce these emissions, and the cost of that, taking into consideration the available substitutes to do that, it must done in all

Stakeholders, which there are activities greenhouse gases emissions in their greenhouse gases emissions, with cooperation between them and the (GAEA) and (SERF).

C. Capacity buildings of study of the impacts of expected climate change on the Syrian environment, and the necessary procedures to take that into consideration in future planes, and make researches to face that, specially in the sectors as; human health, and food product, and agriculture, and energy product, and industry . All stakeholders must cooperate with each other's and with universities and researches centers.

1 – Enhance meteorological department technically and financially, to make procedures to

A - Update

- The database and climate information
- Syrian Climate Atlas
- Agriculture Climatic Reference
- Syrian Wind Atlas
- Solar Radiation atlas

B – To form a technical grope to study the expected greenhouse effects on the Syrian climate, and predict what climate could be in the coming decades, and

until 2100. Taking into consideration the sensitivity of the eastern part of Mediterranean to climate change

2 – Enhance all sectors responsible of greenhouse gases emissions in Syria, to update researches of reducing the emissions.

3 - Enhance all sectors, which will take procedures to reduce greenhouse gases emissions in Syria.

4 - Enhance all sectors, which may effect because of climate change, to face that.

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- 8 – SERC, the Country Study on Climate Change Due to Greenhouse Gases (GHG), Damascus 2000**
- 9 – UNDP, And Ministry of Local Administration and Environment, National Environmental Strategy and Action Plan of Syria, Damascus 2003.**
- 10 - UNDP, And Ministry of Local Administration and Environment, the Project of National Capacity Building of Environmental Affairs in Syria, Damascus 2000**

ANNEXES

Annex (1) Tables and Figures

Annex (2) Articles from UNFCCC

**Annex (3) Paragraphs from the National Environmental Strategy
and Action Plan of Syria**

**Annex (4) Paragraphs from the country study on Climate Change
Due to (GHG)**

Annex one

TABLE (1) Green House Gases

GAS	Molecular Symbol
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Carbon Dioxide	CO₂
Carbon Monoxide	CO
Hydro Chlorofluoro Carbons	HCFCs
Hydro Fluoro Carbons	HFCs
Methane	CH₄
Nitrous Oxide	N₂O
Nitrogen Oxides	NO_x
Non-Methane Volatile Organic Compounds	NMVOCs
Perfluoro Carbene	PFCs
Sulfur Hexa Fluoride	SF₆
Sulfur Di Oxide	SO₂
Ozone	O₃
Water Vapor	H₂O

Source: Intergovernmental Panel on Climate Change – Cambridge Univ,
Emissions Scenarios; Cambridge, U.K. press 2000,
(Alagamy, D. N, and Mostafa, A. M. M, and Al Otyby, A. A. S
Scientific Research Kouit Center, Kouit 2004,
Climate Change between Doubt and Assurance)

TABLE (2) Some Greenhouse Gases developed ratio in the atmosphere.

GASES				YEAR
Nitrous Oxide P/ B	Chlorofluoro Carbons " ١٢ "P/T	Methane P/B	Carbon Dioxide P/M	
٢٧.		٧.	٢٨.	Before Industrial Age ١٧٥٠ - ١٠٠٠
		١٦١.	٣١٥	١٩٥٨
			٣٤٥	١٩٨٤
			٣٥.	١٩٨٨
٣١.	٤٨٤	١٧٢.	٣٥٣	١٩٩٠
٣١٤		١٧٤٥	٣٦٥	١٩٩٨
			٣٦٨	٢٠٠٠
٣١٦			٣٧.	٢٠٠٢

Source: IPCC, 2003, Statement at Twentieth Session of the IPCC, France,
(Alagamy, D. N, and Mostafa, A. M. M, and Al Otyby, A. A. S,
Scientific Research Kouit Center, Kouit 2004,
Climate Change between Doubt and Assurance)

TABLE (3) Estimated global evolution of GHG concentrations in the atmosphere.

Gas	Potential sources of emissions	Average lifetime in the atmosphere	Average concentration before 100 years (ppb)	Present average concentration (ppb)	Expected concentration in 2030 (ppb)
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CO	Combustion of fossil fuels and biomass	months	40-80 in northern hemisphere; Absent in southern (clean areas).	100-200 in northern hemisphere; 40-80 in the south (Clean areas).	May increase
CO₂	Combustion of fossil fuels and deforestation	100 years	29000	35000	40000-55000
CH₄	Rice cultivation, livestock, landfills, and petroleum production	10 years	900	1700	2200-2500
NO₂	Combustion of fossil fuels and biomass burning	Days	0.001-xx (clean-industrial areas)	0.001-50 (clean-industrial areas)	0.001-50 (clean-industrial areas)
N₂O	Fertilizers, deforestation, and Biomass burning	170 years	285	310	310-330
SO₂	Combustion of fossil fuels and mining	Days to weeks	0.03-xx (clean-industrial areas)	0.03-xx (clean-industrial areas)	0.03-50 (clean-industrial areas)
CFCs	Refrigerants, blowing agents, atomizers.	60 to 100 years	0	# 3 (Cl atoms)	204-6 (Cl atoms)

Source: Environmental & Scientific Research Center (ESRC), Country Study on Climate Change Due to Greenhouse Gases (GHG), Damascus 2000

**Table (4) Weather indicators because of temperature increase
During twentieth century**

Weather indicators	Changes observed in atmosphere and climate and environmental systems during the last century
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Global average of surface temperature	Increased by (0.2 – 0.6) °C, the land warmed more than oceans.
Surface temperature in northern hemisphere	Increased during twentieth century more than any other century during the last 100 years, the nineteenth decade was the warmest one in that century
Daily surface temperature range	Decreased from 1950, until 2000, over land, and minimum temperature increased during night, twice more than maximum temperature during daytime
Hot days / temperature indicator	Increased
Cold days / frost	Decreased in most land territories during twentieth century
Precipitation	Increased by (7 – 10) % in northern hemisphere, even it decreased in some territories as (north and west Africa, and parts of Mediterranean).
Heavy rains phenomenon	Increased in meddle altitudes, and northern high altitudes territories.
Severity drought and succession	Increased during summer, With what combined it of drought cases appears in some territories, as Asia and Africa, an Increase of succession and severity drought cases and in the last decades .

Source: Wattson, R, and others, IPCC, World Bank, CLIMATE CHANGE,
The collective report, 2001,
(Alagamy, D. N, and Mostafa, A. M. M, and Al Otyby, A, A. S,
Scientific Research Kouit Center, Kouit 2004
Climate Change between Doubt and Assurance)

Table (5) lists the progress in the annual production of crude oil and natural gas during the period 1980-1996

Year	Crude oil m3	Natural gas Total 1000 m3 normal
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	Heavy	Light	Total	Total
١٩٨٠	٩١٩٨٣١٢		٩١٩٨٣١٢	404000
١٩٨١	٩٤٩٣٤٧٣		٩٤٩٣٤٧٣	435000
١٩٨٢	٩٠١٠٠٥٨		٩٠١٠٠٥٨	414000
١٩٨٣	٩٣٥٩٤٥٦		٩٣٥٩٤٥٦	473000
١٩٨٤	٩٤١٧٠١٧		٩٤١٧٠١٧	507000
١٩٨٥	٩٧٣٣٩٣٤	٤٩٧٣٤١	١٠٢٣١٢٧٥	538000
١٩٨٦	١٠٧٨٨٠٤٩	١٢٧١٧٩٦	١٢٠٥٩٨٤٥	468000
١٩٨٧	٩٨١٦٩٢٨	٣٥١٥٠٦٠	١٣٣٣١٩٨٨	548000
١٩٨٨	٩٧٣٦٣٣٤	٥٨١٦٨٠٧	١٥٥٥٣١٤١	١١١٤٠٠٠
١٩٨٩	٩٥٣٧٣٣١	١٠١٤٤٤٨٦	١٩٦٨١٨١٧	١٤٤٨٠٠٠
١٩٩٠	٩٢٤٠٤١٥	١٤٢٣٣٢٦٦	٢٣٤٧٣٦٨١	٢٠٨٧٠٠٠
١٩٩١	٩٢٣٥٤٠٢	١٨٦٣٣٤٨٧	٢٧٨٦٨٨٨٩	١٨٢٩٠٠٠
١٩٩٢	٨٩٢٨٨٨١	٢٠٨٣٤٣١٨	٢٩٧٦٣١٩٩	١٢١٦٠٠٠
١٩٩٣	٨٨٩٢٣٤٧	٢٣٧٣٨٢٣٤	٣٢٦٣٠٥٨١	1452000
١٩٩٤	٨٨٦٩٦٦٣	٢٣٧٨٦١٣٩	٣٢٦٥٥٨٠٢	5333000
١٩٩٥	٨٨١٥٠٥٦	٢٥٤٧٥٤٨٩	٣٤٢٩٠٥٤٥	5799000
١٩٩٦	٩٠٢٩٥٧٩	٢٤٧٦١٧٩٤	٣٣٧٩١٣٧٣	6034000

Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG), Damascus 2000.

Table (6) Present and Future Consumption of the Oil Products and Gas

<i>Year</i>	<i>Oil products and Natural Gas 1000 Tons oil equivalent</i>	<i>Oil products and Natural Gas TJ</i>	<i>Remarks</i>
1990	8500	357000	
1994	11500	483000	
2005	19500	819000	
2010	24500	1029000	

Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG) Damascus 2000.

Table (7) The Electrical Energy Production and the Peak Load pent

Year	Generated Energy GWh	Peak Load M.W.
١٩٧٠	٧٧٧	١٧٤
١٩٧٥	١٣٤٩	٢٩٢

١٩٨٠	٣٧٢٠	٧٧٠
١٩٨٥	٧٨٤٠	١٤٩٨
١٩٨٦	٧٧٩٤	١٥٧٦
١٩٨٧	٨٢٤٧	١٦٠٠
١٩٨٨	٩٣٥٧	١٦٤٨
١٩٨٩	١٠١٦١	١٩٤٣
١٩٩٠	١١٣٣٥	٢٠٠١
١٩٩١	١٢٠٨١	٢٠٣٨
١٩٩٢	١٢٣٣٢	٢٣٣٤
١٩٩٣	١٢٣٩٦	٢٣٨٧
١٩٩٤	١٤٧٠١	٢٦٠٠
١٩٩٥	١٦٤٤٦	٢٨٤٧
١٩٩٦	١٨١٥٠	٢٩٩٤

Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG) Damascus 2000.

Table (8) expected Greenhouse Gases emissions (in 1000 tons) in the energy sector up to 2005. In SAR

Sector	2005			
	CO ₂	CH ₄	N ₂ O	CO ₂ equivalent
<i>Electricity Generation</i>	18000	0.224	0.0235	18012
<i>Transportation</i>	8400	0.155	0.0164	8408
<i>Household</i>	12800	0.154	0.01	12806
<i>Industry</i>	10000	0.141	0.0148	10008
<i>Agriculture</i>	1900	0.05	0.006	1903
<i>Total</i>	51100	0.715	0.0707	51137

Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG) Damascus 2000.

Table (9) expected Greenhouse Gases emissions (in 1000 tons) in the energy sector up to 2010. In SAR

Sector	2010
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	CO ₂	CH ₂	N ₂ O	CO ₂ equivalent
<i>Electricity Generation</i>	22600	0.282	0.0297	22615
<i>Industry</i>	10600	0.178	0.0187	10610
<i>Transportation</i>	16100	0.197	0.0206	16111
<i>Household</i>	12400	0.194	0.0204	12410
<i>Agriculture</i>	1900	0.05	0.006	1964
<i>Total</i>	63600	0.901	0.0954	63692

Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG) Damascus 2000.

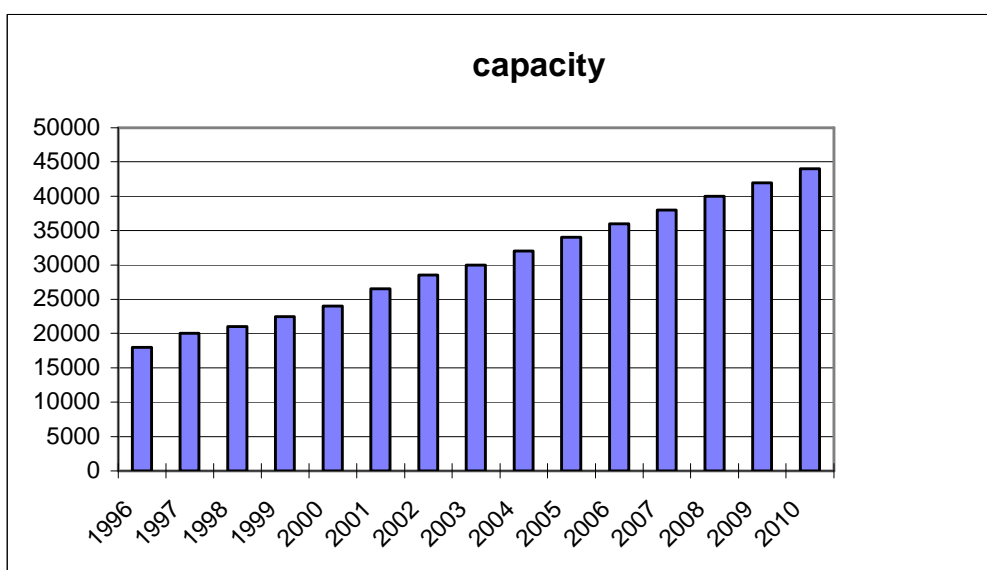
Table (10) Comparison between the expected (GHG) emissions in the Energy sector during 2005-2010 and the main years 1990-1994 in SAR

Sector	1990	1994	2005	2010
	CO ₂	CO ₂	CO ₂	CO ₂
<i>Electricity Generation</i>	8400	10500	18000	22600
<i>Industry</i>	4100	4900	10000	10600
<i>Transportation</i>	5300	7500	8400	16100
<i>Household</i>	5600	6000	12800	12400
<i>Agriculture</i>	1900	1900	1900	1900
<i>Total</i>	25300	30800	51100	63600

Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG) Damascus 2000.

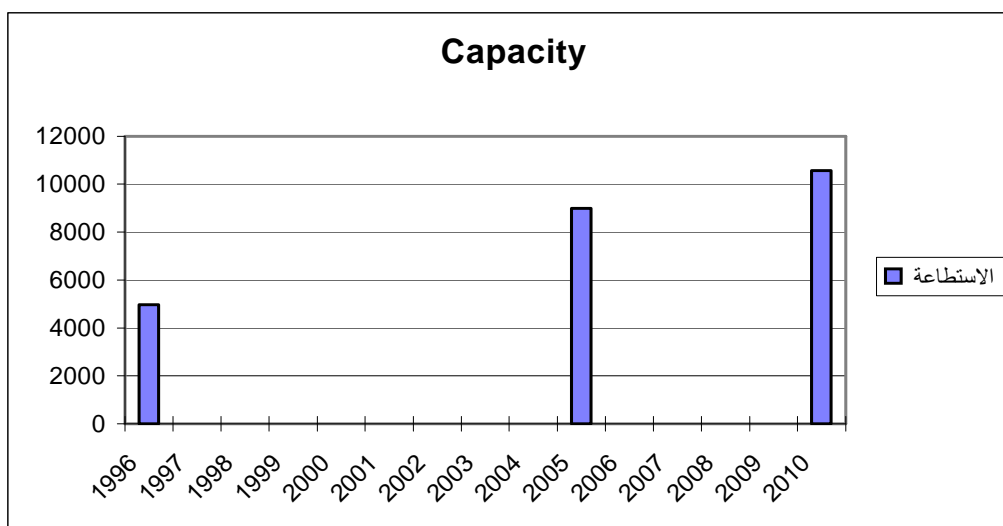
Figure (1) Development of Energy Demand

From 1996 to 2001 in SAR



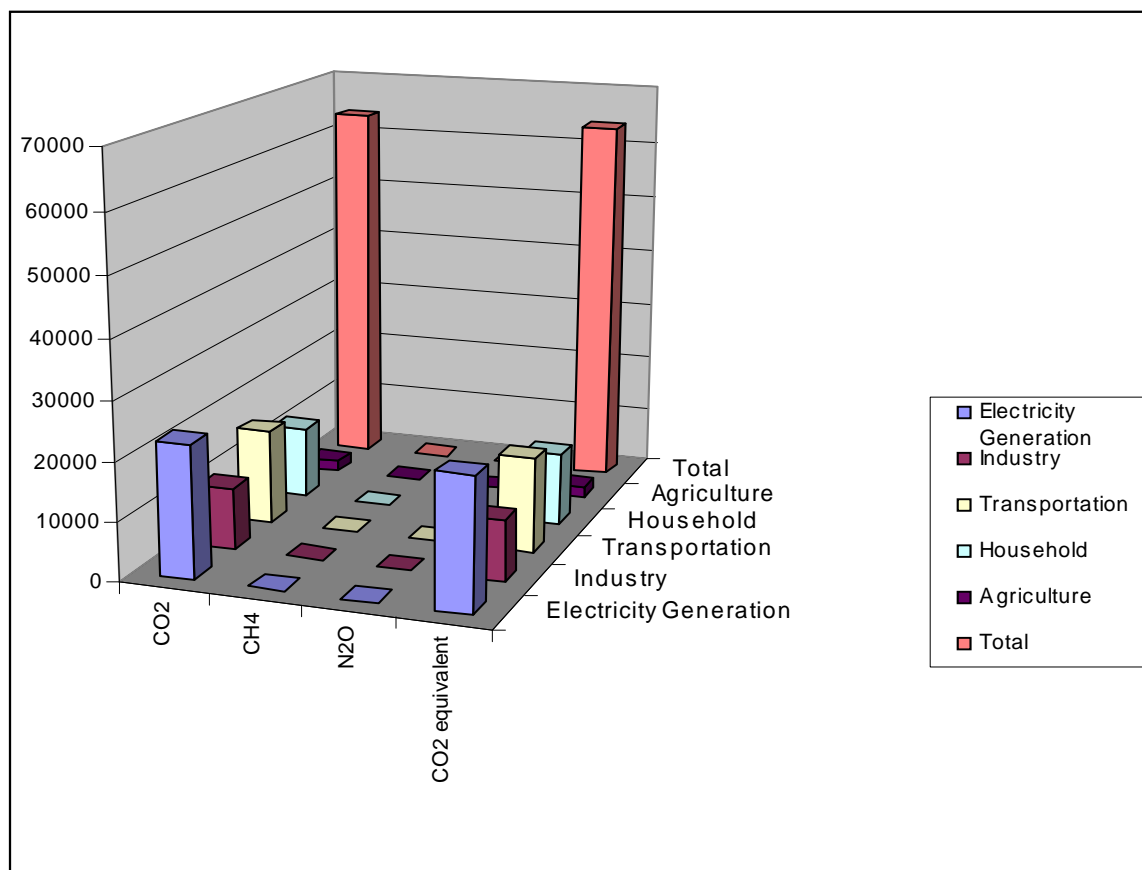
Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG) Damascus 2000.

Figure (2) Development of Installed Electrical Capacities from 1996 to 2010 in SAR



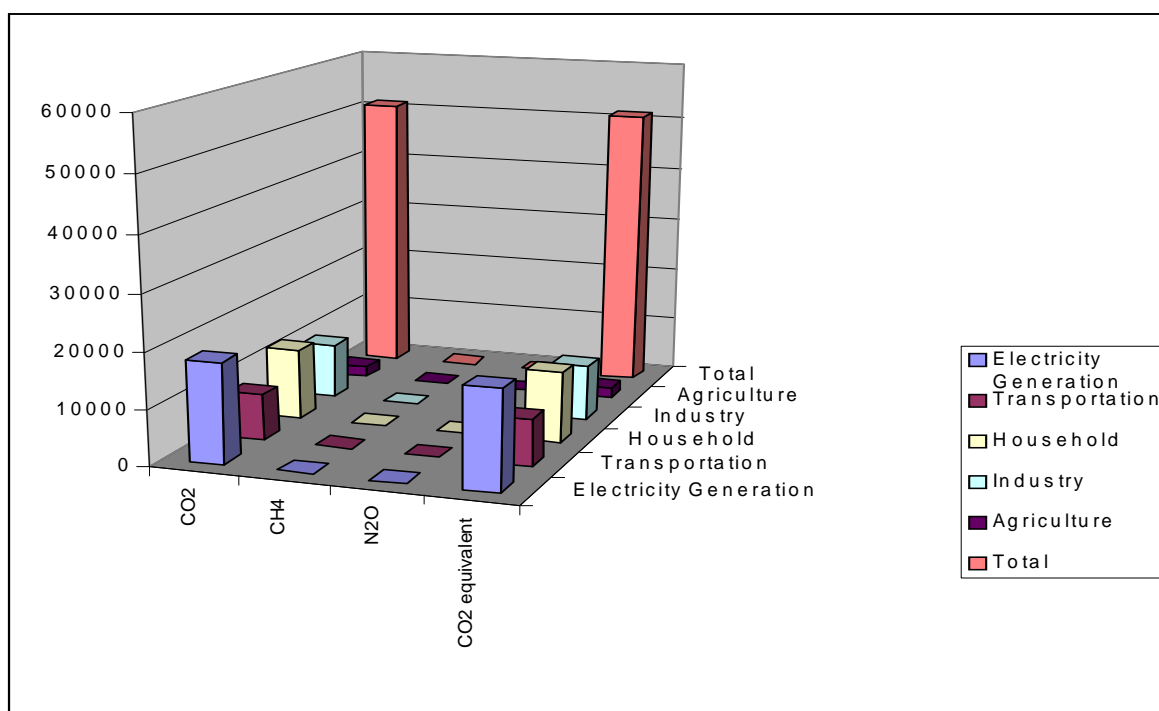
Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG) Damascus 2000.

**The curve (3): The (GHG) emissions during 2005
In SAR**



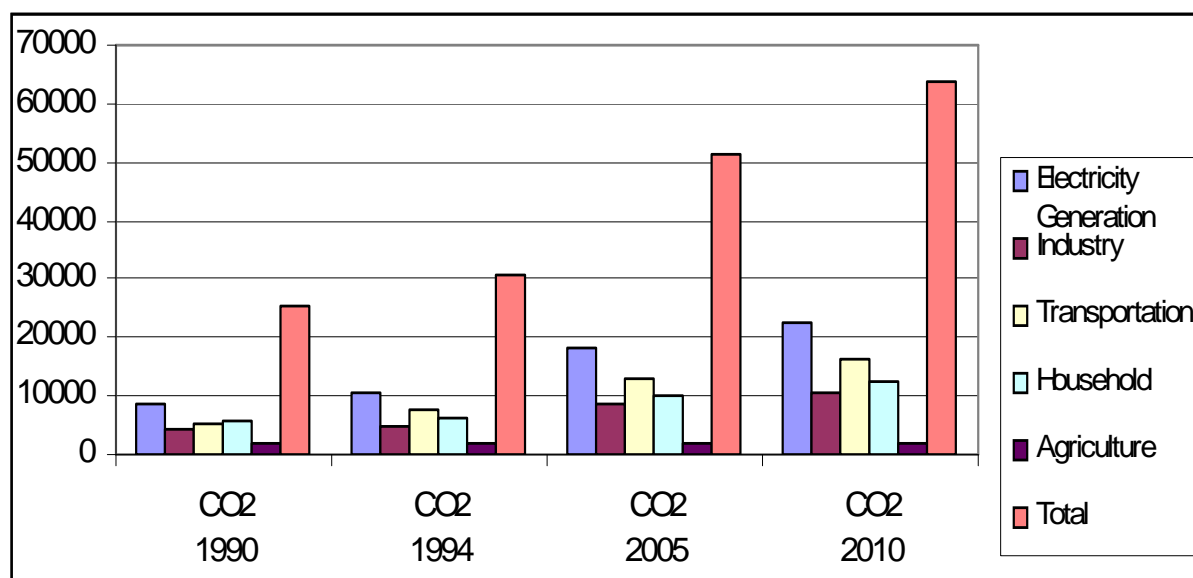
**Source: Environmental & Scientific Research Center (ESRC) Country
Study on Climate Change Due to Greenhouse Gases (GHG)
Damascus 2000.**

The curve (4): The (GHG) emissions during 2010 In SAR



Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG) Damascus 2000.

The curve (5): Comparison between (GHG) emissions Between 2005 and 2010 in SAR



Source: Environmental & Scientific Research Center (ESRC) Country Study on Climate Change Due to Greenhouse Gases (GHG) Damascus 2000.

ANNEX 2

United Nations Framework Convention on Climate Change (UNFCCC)

ARTICLE four COMMITMENTS

1. All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall:

(a) Develop, periodically update, publish and make available to the Conference of the Parties, in accordance with Article 12, national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties;

(b) Formulate, implement, publish and regularly update national and, where appropriate, regional programs containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change;

(c) Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;

(d) Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems;

(e) Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods;

(f) Take into account climate change into account, to the extent feasible, in their relevant social, economic and environmental policies and actions. and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change;

(g) Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies;

(h) Promote and cooperate in the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies;

(i) Promote and cooperate in education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non- governmental organizations; and

(j) Communicate to the Conference of the Parties information related to implementation, in accordance with Article 12.

2. The developed country Parties and other Parties included in Annex I commit themselves specifically as provided for in the following:

(a) Each of these Parties shall adopt national policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases, protecting, and enhancing its greenhouse gas sinks and reservoirs.

These policies and measures will demonstrate that developed countries are taking the lead in modifying longer-term trends in anthropogenic emissions consistent with the objective of the Convention. In addition, recognizing that return by the end of the present decade to earlier levels of anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol would contribute to such modification.

(b) In order to promote progress to this end, each of these Parties shall communicate, within six months of the entry into force of the Convention for it and periodically thereafter, and in accordance with Article 12, detailed information on its policies and measures referred to in subparagraph (a) above

Article 7 greenhouse gases for the purposes of subparagraph (b) above should take into account the best available scientific knowledge, including of the effective capacity of sinks and the respective contributions of such gases to climate change. The Conference of the Parties shall consider and agree on methodologies for these calculations at its first session and review them regularly thereafter.

(d) The Conference of the Parties shall, review the adequacy of subparagraphs (a) and (b) above. Such review shall carry out in the light of the best available scientific information and assessment on climate change and its impacts, as well as relevant technical, social and economic information. Based on this review,

The Conference of the Parties shall take appropriate action, which may include the adoption of amendments to the commitments in subparagraphs (a) and (b) above. The Conference of the Parties, at its first session, shall also take decisions regarding criteria for joint implementation as indicated in subparagraph (a) above. A second review of subparagraphs (a) and (b) shall take place not later than, 31 December 1998, and thereafter at regular intervals determined by the Conference of the Parties, until the objective of the Convention met,

(e) Each of these Parties shall:

(i) Coordinate as appropriate with other such Parties, relevant economic and administrative instruments developed to achieve the objective of the Convention; and

(ii) Identify and periodically review its own policies and practices which encourage activities that lead to greater levels of

anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol than would otherwise occur;

(f) The Conference of the Parties shall review, not later than 31 December 1998, available information with a view to taking decisions regarding such amendments to the lists in Annexes I and II as may be appropriate, with the approval of the Party concerned;

(g) Any Party not included in Annex I may, in its instrument of ratification, acceptance, approval or accession. Alternatively, at any time thereafter, notify the Depositary that it intends to bound by subparagraphs (a) and (b) above. The Depositary shall inform the other signatories and Parties of any such notification.

3. The developed country Parties and other developed Parties included in Annex II shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations under Article 12, paragraph 1. They shall also provide such financial resources, including for the transfer of technology, needed by the developing country Parties. The implementation of these commitments shall take into account the need for adequacy and predictability in the flow of funds and the importance of

Appropriate burden sharing among the developed country Parties

4. The developed country Parties and other developed Parties included in Annex II shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.

5. The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and expertise to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies.

6. in the implementation of their commitments under paragraph 2 above,

A certain degree of flexibility shall be allowed by the Conference of the Parties. To the Parties included in Annex I undergoing the process of transition to a market economy, in order to enhance the ability of these Parties to address climate change, including with regard to the historical level of anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol chosen as a reference.

7. The extent of developing country Parties, will implement their commitments. under the Convention will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties.

8. In the implementation of the commitments in this Article, the Parties have to consider what actions are necessary. Under the Convention, including actions related to funding, insurance and the transfer of technology, to meet the specific needs and concerns of developing country Parties arising from the adverse effects of climate change and/or the impact of the implementation of response measures, especially on:

- (a) Small island countries;
- (b) Countries with low-lying coastal areas;
- (c) Countries with arid and semi-arid areas, forested areas and areas liable to forest decay
- (d) Countries with areas prone to natural disasters;
- (e) Countries with areas liable to drought and desertification;
- (f) Countries with areas of high urban atmospheric pollution;
- (g) Countries with areas with fragile ecosystems, including mountainous ecosystems;
- (h) Countries whose economies are highly dependent on income generated from the production, processing and export, and/or on

consumption of fossil fuels and associated energy-intensive products;
and

(1) Land-locked and transit countries

Further, the Conference of the Parties may take actions, as appropriate, with respect to this paragraph.

9. The Parties shall take full account of the specific needs and special situations of the least developed countries in their actions with regard to funding and transfer of technology.

10. The Parties shall, take into consideration in the implementation of the commitments of the Convention, in accordance with Article 10, the situation of Parties, particularly developing country Parties, with economies that are vulnerable to the adverse effects of the implementation of measures to respond to climate change. This applies notably to Parties with economies that are highly dependent on income generated from the production, processing and export, and/or consumption of fossil fuels and associated energy-intensive products and/or the use of fossil fuels for which such Parties have serious difficulties in switching to alternatives.

Annex 3

1. Executive Summary

1.1 Background

The Syrian Arab Republic lies on the eastern coast of the Mediterranean Sea. Turkey borders it from the north, Iraq from the east, Jordan from the south, and the Mediterranean Sea and Lebanon and Palestine from the west. Land surface area is 185,180 km², one third of which is fertile lands and forests. The remainder is desert-like and mountainous terrains.

In 2001, the population of Syria was 18.866 million. By the end of 2005, this number expected to reach nearly 21 million. Currently, over 67% of the Syrian population lives in major cities such as Damascus, Homs, Hama, Aleppo and

coastal-zone cities. This attributed to the high population growth rate and migratory trends from rural areas towards urban centers.

Economic trends in the past 10 years have had a positive effect on the structure of the Syrian economy resulting in the growth of the Gross Domestic Product (GDP) between 1993 and 1998 from 659 billion to 931 billion Syrian pounds. However, due to a number of external factors, Syrian economy experienced a noticeable slowdown, resulting in the decline of the GDP growth rate from 9.7% to -2% between 1999 and 2000. However, in 2001 this rate rebounded back to +3.4%.

The responsibility for dealing with the main environmental issues in Syria lies within a number of ministries, in addition to the Ministry of State for Environmental Affairs. These ministries bear a direct responsibility for providing the legislative framework or the institutional support necessary for environmental work. In addition, even though most national institutions with environmental mandates have established, however, they still lack the capacity to function effectively. Work is currently underway to develop and strengthen the environmental capacities, and to introduce environmental aspects into development strategies during the planning phase. Recently, the Environmental Law approved and issued as Law Number 50 of the year 2002.

State of the Environment

1.2.2 Water Quality

Water pollution is a problem, which affects many localities in Syria. Water pollution is due mainly to the uncontrolled discharge of household and industrial wastewater. Realizing the risks and impacts of this problem, the Syrian government initiated a program for the construction and operation of domestic and industrial wastewater treatment plants in urban areas. As a result, bacteriological and chemical contamination of surface and ground water decreased significantly in these areas. Where drinking water networks are not available, the general population could expose to pathological agents transported by the polluted water, and to the spread of disease because of using contaminated wastewater for crop irrigation. River water pollution also results in the environmental degradation of aquatic ecosystems

1.2.9 Global Environment

The energy sector has gradually evolved from its dependence on fuel oil to natural gas. This conversion process has had positive impacts on green house gas emissions. Syria does not produce any ozone depleting substances controlled under the Montreal Protocol, and has achieved high level in phasing out of these controlled substances. A substance-control system for dealing with ozone depleting chemicals has recently adopted in Syria.

2.4 Institutional and Legislative Framework of the Environment

The responsibility for dealing with the main environmental issues in Syria lies within a number of ministries, in addition to the Ministry of State for Environmental Affairs. These ministries bear a direct responsibility for providing the legislative framework or the institutional support necessary for environmental work.

2.4.1 Institutional Framework

National Level: The Syrian Arab Republic was the first Arab country to establish an independent environment ministry and to incorporate environmental aspects into development planning. In addition, an inter-ministerial body, the Council for the Protection of the environment, established with the responsibility of setting national policy and coordinating environmental management activities. The Ministry of State for Environmental Affairs has a regulatory, coordination, and research functions, and is responsible.

Identifying current environmental problems, and participating in research studies for their remedy, in addition to preventing the occurrence of future environmental problems.

Stipulating the environmental protection policy, and preparing the necessary national strategy, including action plans and programs for implementation.

Utilizing all means and methods to raise public awareness on the importance of protecting the environment, and its resources

Measuring and monitoring environmental parameters in laboratories approved by the Council for the Protection of the Environment, through a specific accreditation process.

Preparing specifications and allowable limit-standards for the environmental parameters, and establishing the criteria and methodology for conducting environmental impact assessments

Undertaking and supporting environmental research studies, and evaluating the environmental risks associated with the use of various types of materials.

Monitoring the activities affecting the environment and undertaken by public and private establishments to verify their conformance to the limits set by the environmental standards and specifications.

A technical consultative committee and a number of secondary technical committees assist the Ministry of State for Environmental Affairs, which operates through the following executive agencies:

The General Council for Environmental Affairs (GCEA), which is the technical arm to the Ministry

The Scientific and Environmental Research Center (SERC), which is the research arm to the Ministry.

The GCEA is responsible for advising the Ministry on policy and technical issues at both the central and local levels. The SERC concentrates on environmental research studies, and has the authority to conduct pollution monitoring, and to coordinate with international research organizations.

Even though most national institutions with environmental mandates have established in Syria, however, they still lack the capacity to function effectively. In principle, there is little available environmental expertise in the Ministry or in the public and private sectors. Nationally, work is underway to assist governmental

Agencies develop and strengthen their environmental capacities, and to introduce environmental aspects into development strategies during the planning phase.

Work is also progressing locally to establish specialized environmental units in order to support these policies. The following summarizes areas where capacity building is required:

Increasing the level of coordination and its effectiveness between the various agencies in the planning, use and preservation of environmental resources (in particular water, land and biodiversity)

Soliciting additional resources for financing environmental projects, and for providing the necessary environmental services

Rectifying the problem of lack of qualified specialists with skills and competencies in the fields of environmental economy, planning, impact assessment, law, and environmental health

Increasing the environmental awareness of personnel employed by various organizations

Strengthening the concept for protection of cultural heritage as a major aspect in environmental protection

Finally, it should note that non-governmental organizations (NGO) are developing into key players on the national environmental scene. Recently, two Damascus-based NGO's obtained the necessary permits for becoming active in the environmental field. In addition, public organizations and unions (such as the engineers' syndicate, the syndicate of agricultural engineers, women's union, farmers' union, and youths' union) have adopted a number of environmental issues in their agenda. Nevertheless, there is still plenty of space for other NGO's in Syria, and these are still required to build their capacities in the field of environment.

Local Level: Twelve environmental directorates have established in the twelve governorates, in order to implement and enforce the adopted environmental policies on the local level. In addition, nine central directorates were set-up in the GCEA as follows:

Directorate for biodiversity and natural protected areas

Directorate for land safety

Directorate for planning, statistics and follow-up

Directorate for climatic changes

Directorate for chemical safety & waste management

Directorate for water safety

Directorate for administrative, legal and financial affairs

Directorate for environmental impact assessment

Directorate for training, environmental awareness & information systems

Secondary environmental committees also established in each governorate, and delegated with the following responsibilities:

Follow-up on the implementation of the decisions of the Council for the Protection of the Environment, on the governorate level, and within the framework of the general government policy

Follow-up on the implementation of the environmental specifications and pollution standards adopted by Council for the Protection of the Environment

Follow-up on the conformance of industrial establishments and others with negative impacts on the environment, to the licensing requirements under which they permitted to operate.

Assisting in the establishment and implementation of emergency plans to deal with environmental disasters on the governorate level

Submitting to the Ministry of State for Environmental Affairs a yearly report on the state of the environment, which describes the environmental problems in the governorate and adopted remedial measures

Recently, the Ministry of State for Environmental Affairs has reviewed and modified its organizational structure in accordance with that shown on Figure 2.3.

٢.٤.٢ Legislative Framework

The environmental law passed by parliament in its session that convened on 26/6/2002, and ratified by the president of the republic on 8/7/2002. It issued as Law Number 50 for the year 2002. The law specified the responsibilities and authorities of the Ministry of State for Environmental Affairs, which includes signifying responsibilities for damages and compensation in cooperation with the Ministry of Justice and other relevant agencies. In addition, in 2002, the Council for the Protection of the Environment approved pollution standards, which set the limits for discharge to the environment. Work is currently underway by the Ministry on the following issues:

Completion of the legislative requirements for the Environmental Law in the form of decisions, plans and guidelines

Preparation of an industry guide for the environment, which explains the methodology for conducting environmental impact assessments

Facilitating and clarifying the environmental impact assessment process so that investors can incorporate its recommendations in the project-planning phase, rather than attempting to avoid it as an unnecessary administrative encumbrance.

Establishing a list of approved laboratories for the purpose of environmental analyses.

The laboratories will accredited based on a process of conformance to a system of procedures for quality control and assurance, prepared specifically for analytical laboratories. Table 2.1 provides a list of environmental laboratories in Syria, including their number, areas of specialization, and agencies in charge.

Preparation of a national hazardous waste management system

Annex (4)

Paragraphs from the country study on Climate Change Due to (GHG).

2.5 The Syrian Environmental Policy

2.5.1 General environmental policy

The Syrian environmental policy based on the close cooperation between different sectors of economy and administration, which characterized by the team spirit. These sectors work according to final directives defined by the national strategy that must implemented in a way to be acceptable by all parties.

This policy aims to introduce important changes in the behavior and positions of the Syrian citizen towards the environment. This done by public informing about

the importance of the available natural resources in the country Also, by encouraging the public to actively participate in the protection of the national resources and in the reduction of their degradation. This will provide the society with a healthier and cleaner environment and will preserve sufficient natural resources for the present and the future generations. This done by taking into consideration the regional and the international aspects of the global environment In addition, the Syrian environmental policy is based on:

- Taking into account the environmental impacts of developing projects
- Developing human society and raising the living standard on healthy environmental bases
- Searching for long-term solutions for the general environmental problems in a way to ensure the continuation of development at the same time
- Protecting the environment according to the basis and the norms constituting the plan for the protection and the preservation of available natural resources
- Collecting and analyzing main economical and social information that have direct impacts on the environment and development of the Syrian economy
- Issuing the necessary legislation, regulations, and pollution Acts for the protection of the Syrian environment
- Environmental planning which ensures the optimal use of national resources in a balanced way towards the population and environment;
- Setting principles for the safety and the protection of the environment in collaboration with the different national, regional, and international parties this done by defining the current environmental problems, looking for solutions by participating in scientific studies and research and by reducing the apparition of new problems of environment.

2.5.2 Environmental policy of ESRC

Our generation is the first to see the earth from space. This is to say that the entire human race relies only on one small and vulnerable planet,

Which turns in the space within a weak and closed system suffering from huge environmental problems? Examples on these problems threatening the whole humanity are:

- Greenhouse effect;
- Depletion of the ozone layer;
- Scarcity of waters and the gradual depletion of groundwater reserves;
- Shrinking and degradation of forests;
- Pollution of water, soil, air, foods and plants;
- Desertification and loss of agricultural soil and green cover;
- Degradation of the biological varieties;
- Demographic explosion and many others

It is necessary to use additional funds to study in depth these problems taking into consideration both institutional and financial aspects. The objective is to find

practical and successful solutions through programmes that permit to face the real dangers threatening the limited natural resources. Providing information, technologies and methodologies can save the natural resources, to limit the pollution and to support continues development will do this. Environment is one of most important priorities of our leader and party in Syria. In the same way as development of science, knowledge, and economy in order to build a modern state that can contribute effectively to global development.

It is within the framework of these objectives that the General Commission for Environmental Affairs (GCEA) and the Environmental and Scientific Research Centre (ESRC) have been successively created by decree numbers 11 (21/8/1991) and 16 (4/8/1994), respectively. Indeed, the continuation of development mainly depends on the preservation of environmental elements and the prevention of its pollution due human activities. In addition, it based on environmental and scientific research aiming to find adequate processes and technologies able to limit pollution phenomena and to reduce their effects. Since the foundation of the ESRC, to which the President of the Republic has a particular interest, we have been trying, using all available means and in collaboration with all concerned national and international parties, to achieve our objectives.

The aim of ESRC is to perform scientific research in general and environmental fields. In particular, through a national framework permitting the integration of the environmental work The ESRC focuses on the following aspects:

- To coordinate with other public organizations concerned in scientific and environmental research.
 - To collect and reinforce local and national experiences related to environmental research. Also, to provide them with all available opportunities in order to cope with environmental problems
 - T support and develops scientific efforts in the study of national norms compatible with data imposed by local environmental conditions.
-
- To monitor environmental pollution and recommends possible technical means for the reduction of pollution and limiting the environmental problems to a national level.
 - Setting up a National Environmental Data Bank that can actively participate in the collection and dissemination of environmental data and information with Arabic, regional, and international organizations for pollution monitoring and the fight against national and international environmental pollution
 - Recommend to the Syrian authorities the appropriate methodologies and solutions for environmental problems.
 - To upgrade and equip its analytical laboratories which are involved in scientific and environmental research in order to enable ESRC to follow up the fast scientific development and environmental research in industrialized nations.

- Publish scientific research articles in specialized periodicals and journals. In addition, to participate in similar Arabic and international research ESRC is also aiming at establishing a national journal for environmental issues and scientific research where national, regional, and international researchers can publish their work and findings.
- Cooperate with international and Arabic research centers in order to exchange experiences and to improve the performance level.
- Organize training and continuous environmental education courses in order to improve the quality of scientific research and the level of environmental awareness of the personnel working in the field of scientific research, in general, and environmental sciences in particular.
- Perform scientific studies and research about the hazardous effects resulting from the use of various materials threatening the environment safety. Also, set up the suitable standards concerning the management of these products in order to protect the environment.
- Lead research about all activities (i.e., in the state territories, waters, air, marine life, or in industrial plants) that can affect the environment and suggest proposals about the necessary measures that have to be adopted in order to avoid these dangers
- Perform research and studies necessary to enable Syria to comply with the international agreement schedules concerning the environment. Also, to present the necessary proposals for the protection and development of natural resources
- Perform, in collaboration with other scientific centers, national studies and research concerning the protection of the environment, the adequate use of natural resources and the continuation of the development. In addition, studies will include the precise definition of factors influencing the climatic and human environment especially in the field of the use and the degradation of natural resources.