



**Enabling Activities for Preparation of Syria's Initial National
Communication to UNFCCC, (Project Nr.00045323).**

Strategy and Action Plan for Adaptation to Climate Change in Syria

CLIMATE CHANGE

Damascus, January 2010



Syria - سورية



وزارة الدولة لشؤون البيئة



Syrian Arab Republic
Ministry of State for Environment Affairs (MSEA)
United Nation Development Programme (UNDP)
Global Environmental Facility (GEF)

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This study has been approved unanimously by the technical committee, Headed by Dr. Kaoukab Daya Minister of State for Environmental Affairs, during the Project Technical meeting which took place on January 11th 2010, in the Ministry of State for Environmental Affairs.

Acronyms

CATF	Consultative Assessment Task Force
CBD	Convention on Biological Diversity
CCD	Convention on Combating Desertification
ECATF	Evaluation Criteria Assessment Task Force
EIA	Environmental Impact Assessment
EPA	Environment Protection Authority
GEF	Global Environmental Facility
GCM	General Circulation Model
GDP	Gross Domestic Product
INC	Initial National Communication
ISI	Import-Substitution Industrialization
KM	Knowledge Management
LEG	Least Developed Countries Expert Group
LDC	Least Developed Country
MCA	Multi-Criteria Analysis
MAAR	Ministry of Agriculture and Agrarian Reform
MH	Ministry of Health
MSEA	Minister of State for Environment Affairs
MWE	Ministry of Water and Environment
NAAP	National Adaptation Action Plan
NPCU	National Project Coordination Unit
NEAP	National Environmental Action Plan
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-Government Organizations
PRSP	Poverty Reduction Strategy Paper
PPTF	Project Portfolio Task Force
PRS	Poverty Reduction Strategies
SATF	Synergy Assessment Task Force
SC	Steering Committee
SG	Stakeholder Group
SLR	Sea Level Rise
SMAP	Short and Medium Term Action Program
MSEA	Ministry of State for Environment Affairs (MSEA)
TC	Technical Committee
UN	United Nations
UNCBD	United Nations Convention on Conservation of Biodiversity
UNCCD	United Nations Convention on Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program
V&A	Vulnerability and Adaptation
WMO	World Meteorological Organization

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Executive Summary

The cause and effects in time and space of climate change constitute an extremely complex topic. From a scientific point of view, perplexities particularly concern the factors that caused the phenomenon and the impact on a local and global scale. Although numerous studies confirm the influence of green house gases (GHG) on the thermal balance of the earth and they therefore ascribe to climate change an anthropic reason, nevertheless many experts consider the current increase in the planet temperature as a natural phase of climatic evolution that has already occurred in other eras.

The lack of agreement on causes of climate change affects the opportunity to adopt a common strategy to reduce GHG emissions. In the industrial countries, these measures entail intense changes in the energy policy, investments for the development of alternative energy and the introduction of constraints and changes for firms. For the developing countries, forced between environmental and economic emergencies, a change in the energetic balance and the associated economic system reconversion have to face strong resistances since they bring about an additional cost delaying the industrial development and the achievement of short term objectives of development policy.

Given that climate change is one of the factors that contribute to the desertification process, it becomes particularly important in the Mediterranean basin, which is already characterized by the presence of large desert areas where the precarious balance is deeply exposed to environmental degradation.

The Enabling activities for Preparation of Syria's initial National Communication to UNFCCC (INC project) is financed by GEF/UNDP and is being implemented at the Ministry of State for Environment Affairs (MSEA) with the goal of preparing the First Communication Report on Climate Change in Syria.

Weather in Syria can be divided into five climatic regions and into 5 agricultural settlement zones depending on average annual precipitation ranging from over 800 mm in the humid zone I to less than 100 mm in the dry zone V.

In Syria, farming systems have to a large extent been influenced by the physical and climatic characteristics of the five major agro-ecological zones.

Data collected from 30 metrological stations over the period from 1955 to 2006 show significant changes in average annual precipitation during both winter and autumn seasons. Winter precipitation has decreased during the last five decades in the northern and north eastern zones of Syria. Autumn precipitation, on the other hand, has increased in the northern central zone Syria. The reasons behind that's changes are not well understood.

The same data show that there is a general tendency for decreased temperatures during winters especially in the coastal region and western inlands. The same trend is observed during springs and autumns. Summer temperatures are observed to increase in the coastal areas.

The majority of agricultural production in Syria derives from small family-based farms. In total, some 98% of national agricultural production is in private hands. Despite this dominance of the private sector, the Government plans the areas to be planted annually to key crops and implements a crop area licensing system for farms of over 0.5 hectares.

The Government also intervenes intensively in marketing and processing. It owns and operates the majority of the nation's basic agricultural processing facilities, including all

cotton ginneries, sugar factories and tobacco plants, and a set of wheat mills, oil mills and feed factories.

There is an increasing water deficit in Syria as a result of the increasing water demand, frequent drought waves and population growth. In fact, 9% of the annual rainfall runs as surface water most of it evaporates or leak to the ground water. The deficit was estimated at around 20% of the total available water resources. The per capita share of water available for all purposes (drinking, industry and agriculture) declined during 1996-2005 by an annual rate of 0.73% from 950 m³/per capita/year in 1996 to 883 m³/per capita/year in 2005 reaching its lowest value in 2000 (767 m³/per capita/year) and indicating a less rate than that of water poverty level agreed upon internationally (1000 m³/per capita/year for all purposes).

The effect of adverse conditions of climate change would, in the near future, result in an increase water requirement by about 10- 20% for agricultural purposes, and to decreased productivity and production accordingly when the extra water requirements are not attained.

Since water resources are limited in Syria, the government plans like the Syrian Agricultural Strategy, five year plans and annual plans aim at improving water resource management, maintaining it by the renewable level, organizing its investment and ameliorating its uses.

A Strategy and a National Adaptation Action Plan is developed. The primary goal of NAAP process is to identify priority measures to adapt to climate change and climate variability, and develop them into project based activities that can address urgent needs for adapting to the adverse impacts of climate change in Syria.

The objectives of the National Adaptation Action Plan:

- 1) Identify challenges hindering adaptation to climate change;
- 2) Identify national constraints limiting the proper implementation of the activities related to the UN Framework Convention on Climate Change (UNFCCC).
- 3) Provide a practical framework to enhance the national capacity for synergistic implementation of the UN Framework Convention on Climate Change.
- 4) Streamline the commitments and obligations entailed in the global environmental management system into national policies.

NAAP is developed through different stages including:

- The establishment of the NCI Steering Committee;
- Identify and describe the National Circumstances;
- Prepare green house gases (GHG) emissions inventory;
- Develop programs to measures adaptation to climate changes;
- Develop programs to measure the mitigation of the GHG emissions;
- Identify constrains and gaps (capacity, financial and technical);
- Prepare the Initial National Communication Report; and
- Develop a strategy and a national action plan for adaptation to climate change in Syria.

All studies were conducted by national experts from different stakeholders. The choice of national consultants was based on a transparent recruitment process that aimed at widening the range of expertise and backgrounds of national consultants. For ensuring a wide representation of the national sectors and stakeholders, the national consultants for the

main reports were selected in a way that included experts from public sector, academia, and NGOs. All reports were revised by the Focal Point of the UNFCCC at MSEA and by national experts, and then presented to stakeholders in technical group meetings and national workshops.

This assignment is a direct result of the national workshop on National Adaptation Action Plan which was held by the Syria's National Communication (INC) Project in Palmyra on 24 March 2009. The workshop was attended by representatives of the concerned stakeholders in addition to interested regional and international organizations that are working in Syria.

The National Adaptation Action Plan has been developed within the framework of the national socio economic plans and the general policies especially the policy for environmental affairs in Syria, which was presented to the 15th COP to UNFCCC and the 5th Meeting of the Parties to the Koyoto Protocol (Copenhagen, December 2009).

The INC National Adaptation Action Plan, the implementation and sustainability aspects were taken into deep consideration while designing the Action Plan as well as a proper and effective management and follow-up tools in MSEA and other institutions related to implementing the INC Action Plan.

Accordingly, the INC Strategy is designed on the basis of the following six themes:

- 1) Develop sustainable institutional coordination mechanisms;
- 2) Develop clear and systematic integration of the UNFCCC concepts in the national policy and legislation;
- 3) Sustainable development of agricultural and water resources;
- 4) Capacity development, knowledge management, networking, outreach and awareness
- 5) Develop means for technology transfer; and
- 6) Local communities' empowerment and participation

A review of potential evaluation criteria focused on the NAAP Annotated Guidelines as well as for the 10th and 11th -5 year Socio-Economic Development Plans, the National Environmental Policy presented in Copenhagen Conference on Climate Change (December 2009) the National Environmental Action Plan for Conserving Biodiversity, and the National Action Plan for Combating Desertification. Stakeholders were consulted for finalizing the following set of evaluation criteria by which to evaluate each proposed adaptation measure was chosen:

- Contribution to sustainable development;
- Livelihood security of local communities;
- Poverty reduction to enhance adaptive capacity;
- Synergy with other multilateral environmental agreements; and
- Cost-effectiveness.

NAAP Includes the following 16 projects within six themes:

- 1) Development of a sustainable coordination mechanism among institutions implementing the NCI National Action Plan;
- 2) Strengthen the technical capacity of the UNFCCC focal point at the MSEA;
- 3) Develop a regulatory framework for systematic integration of the concepts of UNFCCC in the national policy and legislation;

- 4) Development of a policy system for assessing the impact of the economic and trade agreements on the environment;
- 5) Integrated Agricultural production;
- 6) Conservation and rational use of water resources including modern irrigation;
- 7) Develop and implement easily accessible drought forecast and drought monitoring information systems to improve drought preparedness;
- 8) Development of the investment environment in agriculture and agribusiness;
- 9) Develop Sustainable Awareness on Adaptation to Climate Change;
- 10) Establishment and Maintaining of Climate Change Database;
- 11) Develop agricultural and water research and extension;
- 12) Development of knowledge management and networking;
- 13) Development of a technology transfer system and capacity building for energy efficiency and renewable energy;
- 14) Develop linkages between policy-making and research, and national policies of technology transfer at the regional and international levels;
- 15) Create environment for renewable energy and develop capacity for rational and efficient uses of energy; and
- 16) Development and implementation of a comprehensive capacity building and innovation program for community management of natural resources based on traditional knowledge.

There is a range of challenges that could threaten the ultimate implementation of priority adaptation activities identified by the NAAP process. Potential challenges are of various types including technical, economic, financial and institutional in nature at different levels.

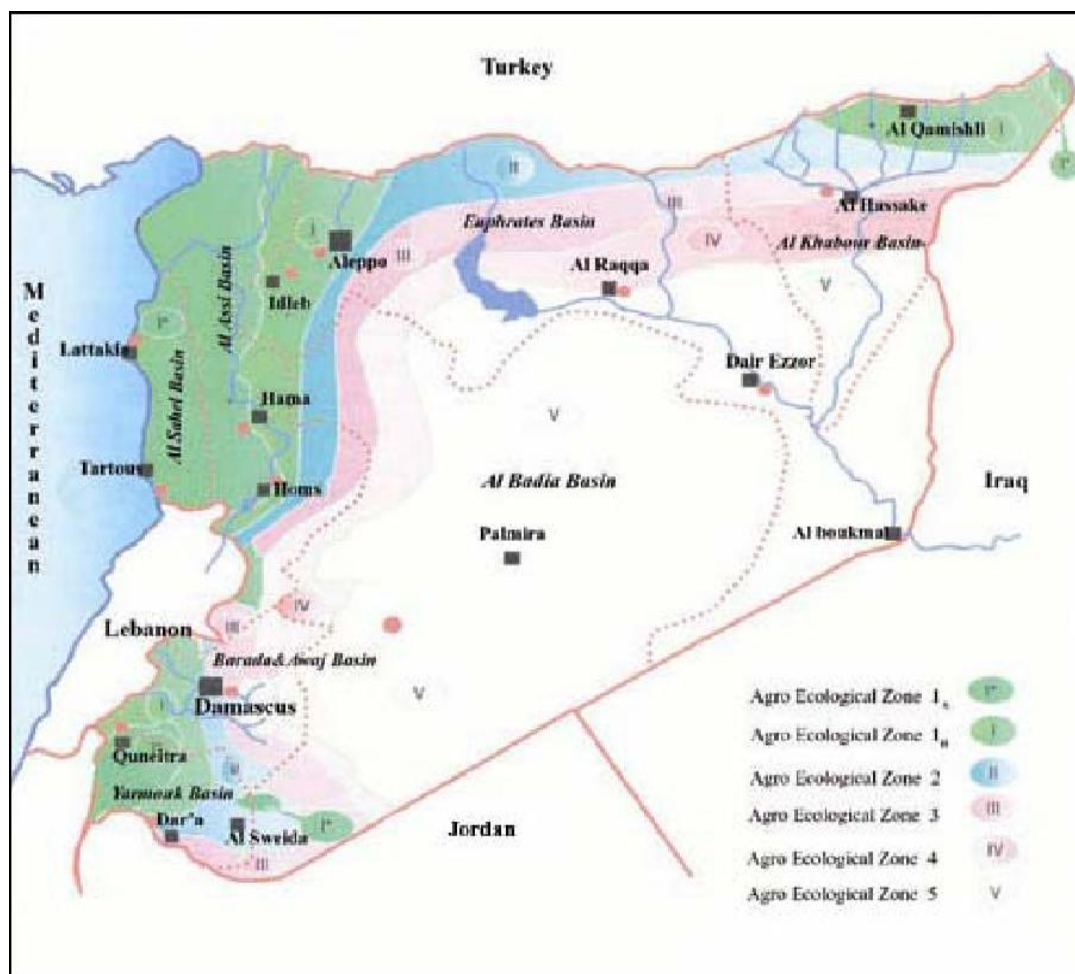
A mechanism for NAAP implanting, monitoring and evaluation is finally developed.

Stakeholder agreed that further delay in adaptation would significantly increase vulnerability of the other sectors, and/or lead to much higher adaptation costs in the future.

1. Introduction

1.1. Location

Syria is located at the eastern coast of the Mediterranean between Latitude °32.19 and °37.25 in the Northern Hemisphere, and the two longitudes of: °35.43 and °41.25 in the East. The total surface area of Syria is 185180 Km². Syria is bordered by Turkey from the north, Iraq from the east and southeast, Jordan and Palestine from the south and Lebanon and the Mediterranean from the west (Map 1).



Map 1. The Agricultural Settlement (Agro-Climatic) Zones and Water Basins in Syria

Source: The General Commission for Agricultural Scientific Research (Adapted from NAPC, 2007).

1.2. Population

The population of Syria was estimated at about 12.3 millions in 1990 and reached 14.153 millions in 1995. The average population growth rate was estimated at about (3.4%). Population was estimated at about 19 millions in 2007 (Figure 1). It is expected that by the year 2020, there will be over 30 million mouths to feed.

The annual growth rates of population gradually decreased from 3.35% in the 1970s to 3.3% during the period 1991-1994, 2.7% during the period 1995-2000 and 2.4% during the period 2000-2005. Urbanization accelerated remarkably from 43.5% in the 1970s to 49.8% in the 1990s and reached 53.5% in 2007.

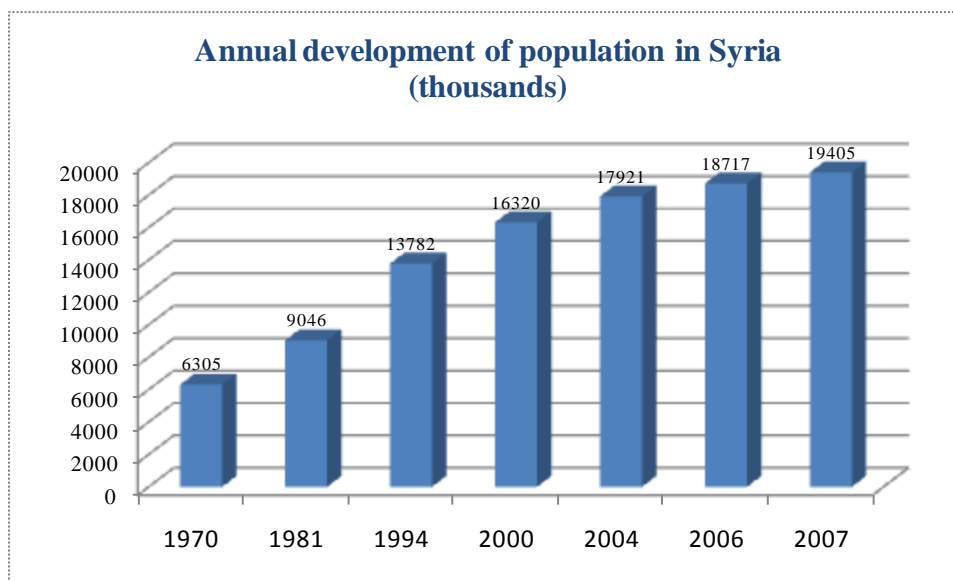


Figure 1. Annual development of population in Syria (thousands) during the period 1970-2007 Source: Statistical Abstracts, 1970-2007.

1.3. Economy

The Syrian economy is typically characterized as highly centralized and under full public sector control. This was no doubt the case prior to 1980, when Syria tried to achieve 'economic independence' through an extensive import-substitution industrialization (ISI) program. Foreign trade was exclusive to public sector enterprises, foreign investments were restricted and, with the exception of a small number of public enterprises, most of the production was geared towards satisfying local demand. However, Syria failed to take ISI to the level of an export-oriented program. A segment of the Syrian industry managed to break out and successfully penetrate East European and former USSR markets, thanks to the special relations Syria had with those countries during the 1980s and to their highly protected markets. Many of those exports were manufactured goods with significant growth potential.

In Syria, as elsewhere, ISI tended to foster mass consumption over capital accumulation, establishing the building of a national market. This created dependency on imported capital goods, without fostering the export capacity needed to earn foreign exchange, thereby precipitating balance of payments difficulties.

Currently, the Syrian economy has two key strengths: First it has maintained macroeconomic and exchange rate stability for almost a decade. Second, its debt (external and internal) to GDP ratio is low and it has accumulated a large reserve of foreign currencies. A remarkable feature of the Syrian economy is that it managed to achieve macroeconomic stability without the adoption of a full-fledged 'neo-liberal' policy package, which typically also includes privatization of public enterprises, liberalization of labor and financial markets, and the reduction of government activity in the field of social policy. However, macroeconomic stability masks several critical weaknesses and challenges. Paramount among which are the low rate of economic growth since the mid 1990s, rapid depletion of oil reserves, a poorly performing public sector, and political turmoil in the region.

The economy grew by an average of 7% a year in the first half of the 1990s, with a peak of 13.5% in 1992. Growth in the second half of the 1990s and early 2000s, however, was

far less favorable so that, from 1999 to 2003, it plummeted to 1 %, reaching a low of -3.6 % in 1999. Consequently, GDP per capita is declining because growth rates are declining faster than that of population growth (GDP per capita growth averaged roughly 5 % from 1991 to 1996 and 0 % from 1997 to 2002). In fact, GDP per capita in 2002 was less than that of 1996.

When GDP is broken down by expenditure for the period from 1996 to 2002, it shows that shares of exports grew from 30.9 % to 42.8 % while the share of imports private consumption declined from 69.5 % to 57.4%.

Private consumption contributed the most to growth of GDP, averaging 3.0 % of the 7.2 % growth rate over the period from 1996-1998. However, private consumption decreased over the subsequent period (-1.7 %). This was not the case for public consumption, which contributed 0.1 % and 0.5 % to overall growth during the 1996-1998 and 1999-2002 periods, respectively. The contribution of net foreign demand (NFD) declined from 4.2 % to 1.2 %, due to an increase in leakages (imports) from aggregate demand. Nonetheless, NFD remained the single largest source of growth over the entire period, highlighting the significant role of oil exports.

As argued in the UNDP Syria case study (2005), in this context, the growth-poverty response of an increase in import-substitution would be highly pro-poor for Syria, given the high share of imports in GDP, the structure of imports and the demand spillovers from an increase in employment, productivity and real wages.

The overall contribution of investment to GDP growth remains low in comparison with other developing countries, and is cause for concern. The contribution of gross investment to GDP was -0.2 % for 1996-1998 and 1 % for 1999-2002, which yields an overall contribution of only 0.4 percent to the 3.6 % total average growth during the entire period. Public investment contribution to growth declined from 0.9 % to -0.1 % over the periods 1996-1998 and 1999-2002, respectively. This reflects the overall poor performance of public sector in Syria. Private investment had a negative (-1.1 %) contribution during 1996-1998. However, its contribution improved somewhat for the period from 1999 to 2002, to reach 1.1 %.

After a period of high growth in the early 1990's, the Syrian economy fell into a recession. This resulted in a growth pattern that was driven by foreign demand. However, growth based on oil exports may prove to be unsustainable. Therefore, a flexible poverty reduction Strategy will have to devise a more sustainable growth path to lift more Syrians out of poverty.

On the supply side, growth during the 1996-1998 was driven mainly by mining and manufacturing, with a contribution of 4.1% (a share of 56.7 %) due mainly to the increase in oil exports, then by agriculture, which contributed 2.6%. Thus, productive sectors contributed over 75% to economic growth during that period. This trend discontinued as the average growth rate of the industrial sector fell sharply from 13.9 to -3% over both periods (from 1996 to 1998 and 1999 to 2002), respectively. Consequently, its contribution to growth declined to an average of -1 % during the latter period.

The average rate of growth of agriculture also declined (from 11.3 to 2.7 %), which reduced its contribution to growth to reach 0.6 %, but it was still the second largest source of growth due to the poor overall rate of growth. Services (trade, transport and communications, finance and insurance and social and other services) contributed the most to growth from 1999-2002 with an average of 1.7 %.

1.4. Climate change worldwide

The fourth Intergovernmental Panel on Climate Change Report (IPCC, 2007) concluded that there is high evidence that the observed changes in the global climate systems are influenced by human activities. Global atmospheric concentration of carbon dioxide, methane and nitrous oxide have markedly increased as a result of human activities since 1970 and now far exceed pre-industrial values determined from ice cores spanning many thousand years. The global increases of carbon dioxide concentration are primarily due to fossil fuel use and land use change, while those of methane and nitrous oxide are primarily due to agriculture.

In support to the conclusions of the IPCC third assessment report of 2001, the Fourth assessment stresses how human-induced climate change will not only affect global temperature, but will also lead to changes in the entire climate system, including precipitation patterns and intensity, sea level rise, frequency and intensity of extreme weather. The impacts of these changes will be differently felt in different regions of the world.

The average global surface temperature is the most fundamental measure of climate change. In the last 10 000 years, human history has been characterized by a considerable increase in temperature and by marked reduction in the extreme of glaciers. Climate variations have altered the borders of the inhabited world and natural space has been transformed in the course of centuries by the settlement of new lands, the conversion of forests into arable lands, the reclamation of marshes, and the settlement of desert areas. However, over the last half century, temperatures have probably been the highest of any 50-years period for the past 1 300 years and there is strong evidence that the process is growing at faster paces. Eleven of the twelve warmest years since 1850 have occurred between 1995 and 2006, and over the last 100 years the Earth has warmed by 0.7 C.

There is an overgrowing body of scientific evidence linking rising temperature to increased atmospheric concentration of carbon dioxide (CO₂) and other greenhouse gases. The effect of these gases in the atmosphere is to retain part of the outgoing solar radiation, whereby raising the temperature of the planet earth. These natural greenhouse effects are what keep our planet habitable; without which the planet would be 30 C colder. Throughout the earth's four previous glacial and warming cycles, there has been a high correlation between atmospheric concentration of CO₂ and temperature. What is the different about the current warming cycle is the rapid rate of which CO₂ concentrations are increasing.

The scenarios of global climate change that appear from these studies do not supply detailed data about changes on a regional scale. The Mediterranean area is certainly one of the most vulnerable regions in the world, for its population intensity, concentration of economic activities in coastal zone, and for climatic borderline balance. During the 20th century, air temperature in the Mediterranean basin was observed to have risen by 1.5-4 C depending on the sub-region. Over the same period and with clear acceleration since 1970, temperatures in south-western Europe (the Iberian Peninsula and south of France) rose almost 2C.

The same warming effect can also be seen in North Africa, though more difficult to quantify given the more patchy nature of the observation system. According to the recent simulation models, in the 21st century, the Mediterranean will experience an increase in average temperature, a significant increase in heat waves and a strong decrease in precipitations. In fact, even in the European Union's objectives of not exceeding the global average temperature increase of 2 C is met, temperature increases in the Mediterranean are

likely to be above 2C and the impacts will be more marked than many other regions in the world because of the ecological and socio-economic characteristics of the area. The natural closed basin of the Mediterranean characterized by weak external changes suppose an amplification of the effects driven by the increase of global warming with serious consequences on marine and terrestrial ecosystems. Mediterranean waters will be more and more exposed to higher temperatures with a double effect: the tropicalization of sea water with a change in the marine fauna and flora, and an alternation of the terrestrial vegetation and of crop patterns with higher free risk.

The Mediterranean countries jointly produced about 8% of the aggregate world emissions of carbon dioxide by 2004. The aggregate emission of the Southern and Eastern Mediterranean countries accounted for 3% of the aggregate world emissions.

Surface waters are polluted by wastewater urban and industrial discharges, while pollution from agriculture (fertilizers and pesticides) threatens the quality of ground sources in the African and Asian side of the Mediterranean.

Water scarcity can be defined by the Water Exploitation Index (WEI). The WEI in a country is defined as the ratio of withdrawals from renewable natural resources to average renewable water resources expressed as a percentage. It points out the countries that have a high water demand compared with their resources. The warning threshold for WEI which distinguished a non-stressed from stressed country is around 20%. Severe water stress can occur where the index exceeds 40% indicating unsustainable water use. An exploitation index equal to or higher than 100% indicates that all renewable resources are already being utilized where countries have to meet the growing part of their demand for water by using non-renewable sources. Gaza (161%), Egypt and Syria (95%) are among such countries.

Global warming is expected to make water resources even scarcer in Southern and Eastern Mediterranean Countries because of a decrease in the average annual precipitation, the increased variability in the frequency and intensity of precipitation events, the increased average temperatures and higher evaporation from dams and reservoirs, and increased urban and irrigation water demands.

In order to overcome water scarcity, countries of the region have heavily invested in technology and facilities to store and divert water resources and deliver water services to households, industries and farms. The increase of water supply meets impediments of financial, social and environmental nature. New prospects are offered by non-conventional water supply such as desalination and reuse of treated domestic wastewaters.

Economic Impacts

The vulnerability of Southern and Eastern Mediterranean Countries to climate change varies according to the share of their economy being sensitive to climate (agriculture, tourism, infrastructure, energy and ecosystem). Estimates indicate that the costs of non-action are likely to be more significant for agricultural countries (Syria, Egypt, Morocco and Tunisia) between 2-9% of the agricultural GDP by 2050.

The environmental and socio economic characteristics of the Mediterranean and these forecasts indicate that the Southern Mediterranean will be among the most rapidly affected by adverse impacts of climate change. The main problem factor by which climate change will be affecting all sectors of the economy is related with the scarcity of water resources. The economic analysis of adaptation in the Mediterranean countries has been fairly limited to date. The few sector elements being available (agriculture in particular) lead to believe that appropriate measures to adapt and reduce vulnerability are likely to have a cost lower

than the benefits that they might yield. However, the capacity of adaptation of Southern and Eastern Mediterranean Countries is limited.

Policies and strategies

Countries negotiated the Koyoto Protocol to establish legally binding obligations for developed countries to reduce their greenhouse gas emissions. Most industrialized nations and some central European economies in transition (the Annex B countries) agreed on legally binding reductions in greenhouse gas emissions of nearly 6 to 8% below the 1990 levels between the years 2008-2012, defined as the first emission budget period. The Koyoto Protocol allows developed countries to reach their targets in different ways. They have to implement domestic Policies and Measures (PAMs) and they are allowed to implement these PAMs with projects abroad and market instruments called flexibility mechanisms. Particularly, short-term objectives aim at reducing emissions by improving energy use and efficiency; medium and long-term objectives include the development of renewable energies such as bio-fuels, biomass, geothermal, solar and wind energies. The use of renewable energies would benefit from bilateral and regional cooperation.

The Short and Medium Term Action Program (SMAP) defined around five priorities in 1997: integrated water management, waste management, hot spot (pollution and biodiversity), integrated coastal area management, and fight against desertification.

The local scale is fundamental to link environmental protection and economical growth and establish the requisites for a development model based on the participative approach. It enables to exploit cultural, environmental and landscape specificities that the cultural homologation derived from the globalization process and from territorial transformation due to climate change is able to remove.

1.5. Climate and climate change in Syria

The climate in Syria is Mediterranean which is characterized by cold and rainy winters and hot and dry summers. The two main seasons are separated by relatively two short transitional seasons: the spring and the autumn. During winter, temperatures are moderated to cold, though frost can be formed in mountains during the night. The rain level stands between 100 and 1400 mm/year. In summer temperatures rise to reach more than 30C in most regions and can reach more than 40C sometimes. This weather is very dry with a high level of evaporation. In winter, Syrian weather is under the influence of two anticyclones whose centres are located in Siberia for the first one and in the Mediterranean Sea for the second one. While in summer Syria is under the influence of a high pressure coming from the Arabian Gulf, the Red Sea and northern Africa.

Weather in Syria can be divided into five climatic regions and into five agricultural settlement zones depending on average annual precipitation ranging from over 800 mm in the humid zone I to less than 100 mm in the dry zone V (Map 1):

In Syria, farming systems have to a large extent been influenced by the physical and climatic characteristics of the five major agro-ecological zones.

❖ Zone I:

Receives an average of rainfall of more than 350 mm. It consists of two sub zones. The first receives more than 600 mm annually where yields of rain fed crops are certain for all the years.

❖ Zone II:

Receives 250-350 mm precipitation annually. Main crops are wheat, barley and summer crops. This zone makes up 13.3% of the country area.

❖ Zone III:

Receives 250-mm precipitation annually. This amount of rainfall is certain for more than 50% of monitored years i.e. 1-2 of 3 years, the production is certain. This zone has mainly grain crops, however legumes can be grown. This zone makes up 7.11 of the total area.

❖ Zone IV (Marginal zone):

Receives 200-250 mm precipitation annually. This amount of rainfall is certain for more than 50% of monitored years. However only barely can be grown and it can be used as permanent pastures. This zone makes up 9.91 of total area.

❖ Zone V:

This is the steppe land zone which makes up 55.1% of the total area of the country and receives less than 200 mm precipitation annually. These lands are not suitable for rain fed cultivation.

Data collected from 30 metrological stations over the period from 1955 to 2006 show significant changes in average annual precipitation during both winter and autumn seasons. Winter precipitation has decreased during the last five decades in the northern and north eastern zones of Syria. Autumn precipitation, on the other hand, has increased in the northern central zone Syria. The reasons behind that's changes are not well understood.

The same data show that there is a general tendency for decreased temperatures during winters especially in the coastal region and western inlands. The same trend is observed during springs and autumns. Summer temperatures are observed to increase in the coastal areas.

1.6. The Agricultural Production

The total area of the country amounts to about 18.5 million ha divided into cultivable land, uncultivable land, steppe and rangelands and forests. The cultivable land comprises the invested and un-invested areas. The invested areas include irrigated, rain-fed and fallow lands. Irrigated and non-irrigated areas represent the cultivated land. The uncultivable land includes sandy and rocky areas, buildings, roads, public places and rivers and lakes.

The shares of the cultivable and uncultivable lands accounted for 32% and 20% respectively of the country's total area. In the same year steppe and rangelands and forests reached about 45% and 3% respectively. Land use differs among settlement zones.

Cereal production averaged 4,664 thousand tons during 1997-2001 and 6,871 thousand tons during 2002-2006 attaining an increase of 26%. Cereals production during 2000-2006 exceeded the targets of the agricultural development strategy with the exception of barley. About 71.6% of the total cereals production (irrigated and rain fed) was concentrated in the governorates of Al-Hassake (29.7-35.2%), Aleppo (18.8-23.7%) and Al-Raqqa (12.7-13.2%).

Increase in cereal production by 79% from 2000 to 2006 is attributed to the changes of the area (3%) and yield. The increase in irrigated cereals production reached 48% during the same two years resulted from the area addition (20%) and yield amelioration (23%).

The main legumes grown in Syria are lentils and chickpeas. Other legumes include dry broad beans, dry peas, dry kidney beans and vetches. Both the government and farmers are interested in increasing the share of legumes in the crop rotation due to their importance for the provision of plant protein for humans and grain feed for the livestock as well as preservation of the soil fertility.

The legumes group accounts for 5.6% of the plant production cropped area, 7% of the crops area, 2% of the plant production and 3% of the crop production. Moreover, it is distinguished for being labor intensive and low water consuming.

The grazing crops (green fodder) comprise the following grazing crops: barley, maize, alfalfa, clover and others. It plays a significant role in both the livestock production and the achievement of the integration between plant and livestock production. The government is giving due attention to increase its share in the crop rotation. These crops are cultivated in small areas as they occupied only 1.1% of the total cultivated area, 1.5% of the crops area, 5.7% of the plant production, and 9.3% of the crops production.

The importance of this group stems from the fact that crops such as cotton, sugar beet, tobacco, peanuts, sunflower and aniseeds, enjoy a high unit return compared to other crops and play an important role in both foreign trades as foreign currency suppliers and generation of employment and income.

Vegetables attracted the attention of both the government and the farmers because it is a main source of income for producers and laborers as it is a labor intensive activity. It also plays a foremost role in the alternative crops strategy as well as in foreign trade. Therefore, the government endeavors to introduce modern technology to vegetables cultivation, with particular reference to modern irrigation technology as vegetables are heavy water consuming crops that are mainly planted in irrigated areas. The products within this group have a high nutritional value, so they are an important component of the food security policy.

Vegetables account for 3.3% of the total plant production area, 3.2% of the crops area, 18% of the plant production and 30% of the crop production.

Fruit trees crops account for a significant portion of employment, income generation, input for agro-food and household industries and foreign trade. Moreover, they are an important source of nutrients that contributes to the food security of the country.

Fruit trees account for 18.5% of the total cropped area and 21% of the plant production. Syria produces a wide variety of fruits, the most important of which are olives, grapes, apples, almonds, citrus, cherries, apricots, and figs.

In accordance with the economic openness policies, the fruit trees area increased on average from 787 thousand ha for the period 1997-2001 to 852 thousand ha during 2002-2006 at a rate of 8%.

Livestock production average contribution is about 37% to the total agricultural production in spite of the fact that this sector obtains about 12% of the total agricultural loans issued by the Cooperative Agricultural Bank. The livestock sector is characterized by being dynamic, less subject to fluctuations (except during severe drought strikes) as is the case of agricultural production, absorbs a good portion of unemployment, generates foreign currency and provides highly nutritious foods.

Moreover, livestock production mainly depends on steppe lands where agricultural practices are not feasible, and on crop residues which are otherwise not very useful.

Steppe lands were the most important grazing ground for most sheep production and a minor proportion of goat production for more than a five-month period annually. Rangelands at this stage contribute less than 15% of the total sheep and goat annual nutrient requirements and about 50% of those for camels.

The impacts of recent drought strikes (1998-2000 and 2007-2009) heavily affected livestock numbers, productivity, production, feed availability and prices in addition to the high increase in meat and dairy prices. These impacts are reflected mainly on the livelihood of the small livestock producers and consumers in general.

Production Policies and Planning

The majority of agricultural production in Syria derives from small family-based farms. In total, some 98% of national agricultural production is in private hands. Despite this dominance of the private sector, the Government plans the areas to be planted annually to key crops and implements a crop area licensing system for farms of over 0.5 hectares.

The Government also intervenes intensively in marketing and processing. It owns and operates the majority of the nation's basic agricultural processing facilities, including all cotton ginneries, sugar factories and tobacco plants, and a set of wheat mills, oil mills and feed factories.

The Government sets producer prices for all the main crops other than fruits and vegetables. For cotton, sugar beet and tobacco, farmers must sell to government organizations at these prices. For the other main crops, farmers now have the option to sell to the Government at the official price or to private buyers at a negotiated price. For all the main crops, other than cotton, lentils and chickpeas destined for export, the Government controls domestic prices through to the point of final sale to consumers.

The five-year plans for agriculture have the overall objective of meeting a government growth target for the sector. The Syrian government has given a great attention to the programs related to land resources and included in the Syrian Agricultural Strategy (2000-2010) and the 10th Five Year Plan (2006-2010) through the following actions:

- Adoption of an ecological agricultural and economic map for Syria that shows the optimal areas for crop and tree production in co-ordination with the land classification according to comparative advantages and the use of the geographic information system.
- Optimal utilization of cultivable land and adoption of crop structures and agricultural rotations that ensure production sustainability and the integration between crop and animal production.

The five-year plan for agriculture is developed taking account of the Ministry of Irrigation plans related to irrigate areas. This is essential because the agricultural plan is necessarily dependent on planned investment in irrigation and, in particular, on the new land that is to be brought under irrigation during the course of the plan.

Although some account is taken of economic factors, the national MAAR targets are based principally on technical considerations, such as water availability and the need for particular crop rotations that will preserve soil fertility.

1.7. Water Resources

Syria is located within the arid and semi-arid areas where water is usually scarce in terms of both per area unit and the average per capita share, not well geographically distributed and difficult to be managed and invested. The average annual per capita share of water is expected to drop by 2025 because of the high population growth rate and the diminishing water quantities received from the common rivers with neighboring countries, which constitute 50% of the available water resources.

Main water resources come from precipitation, which vary in quantity, geographical distribution and profit percentage. Annual consumption of groundwater went above its renewable incomes. This has affected the changes in quantity and quality of groundwater. Rivers are the second source of water by its quantity but it is the most important since it provides stable resources of water. However, the increasing use of the Euphrates waters by Turkey within the framework of its own developing projects has caused an important reduction of the average rate of the river flow.

Most water sources for irrigation in Syria come from rainfall (45 billion m³) and permanent sources (17 billion m³) including the share of the Euphrates River fixed by the temporary agreement with Turkey. Whereas, the available annual water resources are estimated at 15 billion m³. Ground water increased from 3 billion m³ in 2000 to 5.8 billion m³ in 2005, and similarly, the surface water increased from 6.42 to 7.1 billion m³ for the same years.

There are 17 rivers in the country. The Euphrates is the largest river, which runs through Syria for 680 km and has an average flow of 564 m³/sec. The second largest river in Syria is the Al-Khabour which extends for 552 km and is dry now. In addition, Syria has a big dam (Euphrates) besides four dams: Al-Rastan, Katteneh, Teldao and Mhardeh. There are also 154 small dams, three of them totaling 87% of their total storage capacity. The number of the dams increased from 153 with a storage capacity of 16785 million m³ in 2000 to 161 dams with a storage volume of 18629 million m³ in 2005.

There is an increasing water deficit in Syria as a result of the increasing water demand, frequent drought waves and population growth. In fact, 9% of the annual rainfall runs as surface water most of it evaporates or leak to the ground water. This ensures the deficit among the competing uses for different purposes (e.g. drinking water and water for agricultural purposes). The deficit was estimated at around 20% of the total available water resources. The per capita share of water available for all purposes (drinking, industry and agriculture) declined during 1996-2005 by an annual rate of 0.73% from 950 m³/per capita/year in 1996 to 883 m³/per capita/year in 2005 reaching its lowest value in 2000 (767 m³/per capita/year) and indicating a less rate than that of water poverty level agreed upon internationally (1000 m³/per capita/year for all purposes). The per capita share of traditional water sources (ground and surface) that are used for drinking water and domestic use also declined from 759 m³/per capita/year in 1996 to 703 m³/per capita/year in 2005 by a rate of 0.77%. The lowest value (577 m³/per 20 capita/year) was in 2000. Meanwhile, the per capita share of water for agricultural purposes increased from 871 m³/per capita/year in 1996 to 882 m³/per capita/year in 2005 by a rate of 0.12% annually causing a deficit in drink water.

The effect of adverse conditions of climate change would, in the near future, result in an increase water requirement by about 10- 20% for agricultural purposes, and to decreased productivity and production accordingly when the extra water requirements are not attained.

Since water resources are limited in Syria, the government plans like the Syrian Agricultural Strategy, five year plans and annual plans aim at improving water resource management, maintaining it by the renewable level, organizing its investment and ameliorating its uses through:

- Setting a comprehensive national plan for the integrated use and sustainable management of the available water resources in order to protect the ground water and to achieve food security.
- Increasing the irrigation efficiency and improving the water returns of all sources, in particular from the public irrigation schemes which need rehabilitation to introduce the modern irrigation methods. It is also necessary to define water rations for each crop to avoid overexploiting water, to expand the irrigated areas to the maximum and to improve the contribution of the water sector to the Gross Domestic Product (GDP). The focus has to be put on the Basins of severe deficits (Dejla and Al-Khabour Basin and Barada and Awaj Basin).
- Evaluating all current water establishments such as dams and irrigation and drainage projects to rehabilitate them relying on economic returns, environmental impact and good performance, and choosing the projects that serve the sustainable development.
- Prohibit digging of wells and organizing the unlicensed ones by setting up numerators to organize ground water, to define rations according to renewable water resources and to control the consumption of water.
- Protecting the water resources from all sorts of pollution comprising chemicals, sewage, salinity or others.
- Establishing associations for water users to be involved in the programs and irrigation planning for resource allocation in order to keep the water resources out of overexploitation and deterioration.
- Developing methods for artificial rainfall to ensure an optimal agricultural production.
- Studying the possibility of establishing dams in the privileged basins especially in the Coastal and the Euphrates Basin in light of the results of economic and feasibility studies.
- Activating the irrigation projects in use and maintaining them constantly.
- Raising the efficiency of water use for irrigation from 50% to 80% in modern irrigation areas and minimizing the water loss in all irrigation nets.
- Limiting effectively the overexploitation of ground water.
- Expanding the drainage systems in the areas which suffer from drainage and salinity, especially in the Euphrates Basin.

Through the above mentioned policies, substantial improvement was achieved until 2006 in expanding the irrigated area, irrigation efficiency (about 30% of the public irrigation schemes), defining water requirements for crops and introducing modern irrigation methods. There is an increase of the irrigated area from all sources, an expansion of the sprinkle irrigated areas and an enhancement of the irrigated areas by modern schemes at a higher rate than the traditional ones.

Many other projects have been introduced to improve the water efficiency (achieving the highest rate of production for each water drop) like the projects of: “Developing Natural Resource Research”, “Operating and Maintenance of Irrigation and Drainage Systems” in Al-Ghab, Funds for Adopting the Modern Irrigation and Establishing Weather Forecast Stations in coordination with JICA.

IFAD and the Government of Syria are planning to establish a project for the development of Al Kabour Basin in the north eastern area of Syria. The proposed project is in line with the Country Strategy and Opportunities Paper (COSOP-2009-2015), aimed at supporting Government's efforts in improving the socio-economic well-being of the rural poor households and conserving the natural resource base of the country.

Because of the importance of both agricultural research and extension services, twelve stations specialized in irrigation research have been established to define sustainable water consumption rates and adequate cropping patterns at basin level. At the same time, farmers and technicians have been trained to facilitate the transformation process towards the modern irrigation methods.

Finally, it is necessary to adopt policies aiming at eliminating water resource overexploitation, raising the efficiency of water use in all the sectors especially agriculture, utilizing of sewage water in agriculture, using modern irrigation methods (drip, sprinkles, localized irrigation) to rationalize water use and facilitating the provision of financial, technical and institutional infrastructure to implement these policies by various land types and crop species.

2. The Strategy and National Action Plan for Adaptation of Agriculture and Water Resources to Climate Change

2.1. The goal

The primary goal of NAAP process is to identify priority measures to adapt to climate change and climate variability, and develop them into project based activities that can address urgent needs for adapting to the adverse impacts of climate change in Syria.

The objectives of the National Adaptation Action Plan

- 1) Identify challenges hindering adaptation to climate change;
- 2) Identify national constraints limiting the proper implementation of the activities related to the UN Framework Convention on Climate Change (UNFCCC).
- 3) Provide a practical framework to enhance the national capacity for synergistic implementation of the UN Framework Convention on Climate Change.
- 4) Streamline the commitments and obligations entailed in the global environmental management system into national policies.

Key elements of the process included the following:

- Adequate stakeholder representation in all phases of the process, including the NAAP development;
- Synergy and consistency of adaptation measures with national and sectoral policies and plans;
- Capacity building and enhanced awareness for adapting to climate change impacts; and
- Country-driven criteria by which to evaluate and prioritize potential adaptation measures.

2.2. Methodology

The main objective of this assignment is to develop a synthesis report and strategy features and a national action plan for adaptation to climate change in Syria.

This assignment is a direct result of the national workshop on National Adaptation Action Plan which was held by the Syria's National Communication (INC) Project in Palmyra on 24 March 2009. The workshop was attended by representatives of the concerned stakeholders in addition to interested regional and international organizations that are working in Syria.

The INC project was launched at the Ministry of Local Administration and Environment (General Commission for Environmental Affairs - the Ministry of State for Environment Affairs, MSEA now) on the first of June, 2007. The project was composed of various interconnected stages that have resulted in the formulation of the Strategy and National Action Plan for adaptation to climate change in Syria. These stages were:

- 1) Identify and describe the National Circumstances.
- 2) Prepare green house gases (GHG) emissions inventory.
- 3) Develop programs to measures adaptation to climate changes.
- 4) Develop programs to measure the mitigation of the GHG emissions.
- 5) Identify constrains and gaps (capacity, financial and technical).
- 6) Prepare the Initial National Communication Report.

- 7) Develop a strategy and a national action plan for adaptation to climate change in Syria.

2.3. Stages

⇒ Stock Taking

A Steering Committee headed by the Director General of the General Commission for Environmental Affairs (GCEA) of the Ministry of Local Administration and Environment was established as an advisory body to the project. Members of the steering committee represented main stakeholders including the State Planning Commission, GEF, UNDP, and the focal point of the UNFCCC.

Moreover, a national technical committee of experts in the different fields of climate change representing different stakeholders was established to provide technical backstopping for the Project. All stakeholders and available data and studies on fields related to climate change in Syria were identified.

⇒ Describing the National Circumstances

National consultants were recruited to develop the National Circumstances report that aimed at identifying and describing all circumstances in the country.

⇒ Vulnerability and Adaptation

This report helped in the formulation of the priorities in the different sectors including socio economics, agriculture, water resources, health, housing, transportation and energy.

The V&A reports were discussed in a national workshop held in Palmyra on 24 March 2009 resulted in the development and finalization of the priority constraints under each field. A further package of adaptation measures was discussed and priorities were embedded within the Strategic planning process.

The national vulnerability constraints and adaptation priorities were the focus of the subsequent phases of in-depth analysis and development of the INC Action Plan.

⇒ The Green House Gases (GHG) Inventory

A comprehensive inventory study was conducted on the GHG emission from the different major sources including industry, energy, wastes and agriculture.

⇒ Development of the INC National Adaptation Action Plan

The INC Action Plan was based on six programs that represent the priority constraints, and a package of proposed project concepts was developed under each of the six program areas. The selected project concepts were designed in a way to address the needs of implementing the activities of the UNFCC wherever feasible.

The process included high level of participation and transparency where the stocktaking priority constraints, in depth analysis, and the draft Action Plan all extensively reviewed in national workshops and through individual consultation meetings with key stakeholders.

⇒ INC integration into the Ministry of State for Environment Affairs (MSEA)

The Ministry of State for Environment Affairs (MSEA) implemented the INC project. During the project period, the INC has contributed many activities in MSEA. This integration helped INC to station some of its findings and recommendations resulting from the studies conducted into the Strategic objectives of the INC and other national policies.

⇒ Choice of National Consultants

The choice of national consultants was based on a transparent recruitment process that aimed at widening the range of expertise and backgrounds of national consultants. For ensuring a wide representation of the national sectors and stakeholders, the national consultants for the main reports were selected in a way that included experts from public sector, academia, and NGOs. All reports were revised by the Focal Point of the UNFCCC at MSEA and by national experts, and then presented to stakeholders in technical group meetings and national workshops.

⇒ Key Opportunities for Adaptation

Many opportunities exist for more effective integration of climate change adaptation within development activities whether or not effects of climate change are realized. A progress on adaptation to climate change will require:

- Providing a specific government agency (The tare Ministry for Environmental Affairs and SPC) with a broad mandate to pursue mainstreaming adaptation to climate change across all sectors;
- Promoting steps towards the mainstreaming of climate change issues into all national, sub-national, and sectoral planning processes, such as poverty reduction strategies (PRS) or national strategies for sustainable development;
- Combining approaches at the government and institutional level with bottom-up approaches rooted in regional, national, and local knowledge;
- Empowering rural communities so that they can participate in assessments and feed in their knowledge to provide useful climate-poverty information; they also need access to climate information;
- Conducting vulnerability assessments that are design to fully address the different dimensions and causes of poverty;
- Providing access to good quality information about the impacts of climate change such as early warning systems and information distribution systems which can help to anticipate and prevent disasters;
- Improving governance, including an active civil society and open, transparent, and accountable policy and decision making processes, which can have a critical bearing on the way in which policies and institutions respond to the impact of climatic factors on the poor; and
- Integrating climate change impacts into economic planning for the national budget. The rate and pattern of economic growth is a critical element of poverty eradication, and climatic factors can have a powerful bearing on both. Integration will prevent climate change diverting limited resources into disaster relief and recovery activities and away from long-term development priorities.

⇒ INC Linkages with National Development Policies

The INC is designed as a process to consolidate adaptation measures in relation to the themes of UNFCCC with direct linkages to global environmental requirements, which places a challenge to establish a direct link between the INC objectives in national development needs and priorities stipulated mainly in socio-economic issues. This linkage is vital for maintaining the interest in the INC and streamlining the INC Action Plan for adaptation to climate change as another tool in obtaining the country's socio-economic needs.

2.4. INC Sustainability

As the INC is an assessment and Strategic planning project, the sustainability will be a function of the implementation of the Action Plan itself. Sustainability requires high-level support, a resource mobilization strategy and a practical Action Plan with clear and practical objectives. A sustainable coordination system should also be developed and made functional. One of the main elements of sustainability is the expected implementation especially the operational and technical linkages between scientific research and policy making in relation to the UNFCCC themes.

Moreover, the National Adaptation Action Plan has been developed within the framework of the national socio economic plans and the general policies especially the policy for environmental affairs which was presented to COP 15 to UNFCCC and the 5th Meeting of the Parties to the Koyoto Protocol (Copenhagen, December 2009).

Regarding the INC Action Plan, the implementation and sustainability aspects were taken into deep consideration while designing the Action Plan as well as a proper and effective management and follow-up tools in MSEA and other institutions related to implementing the INC Action Plan.

Hence, the INC Strategy is designed on the basis of the following six themes:

- 1) Develop sustainable institutional coordination mechanisms.
- 2) Develop clear and systematic integration of the UNFCCC concepts in the national policy and legislation.
- 3) Sustainable development of agricultural and water resources.
- 4) Capacity development, knowledge management, networking, outreach and awareness.
- 5) Develop means for technology transfer.
- 6) Local communities' empowerment and participation

3. The National Adaptation Action Plan (NAAP) to Climate Change

3.1. The goal:

INC identified the sectors that are vulnerable to climate change in Syria including: socioeconomics, agriculture, water resources, forests, health, tourism and coastal zone. NAAP will focus on agriculture and water resources as critical sectors as they pose potentially severe implications to the citizens at large, and are considered to be in need of immediate and urgent adaptation.

Developing Sustainable Agricultural Programs, It is essential that the broad vision outlined above be pursued in coordination with other national environmental strategies adaptation in order to exploit synergies as they arise. The NAAP process confirmed that climate change issues are indeed closely linked to ongoing national efforts related to the UN Convention Biodiversity (CBD) and the UN Convention on Combating Desertification (CCD).

Drought early warning systems, contingency plans, food security systems, alternative livelihood projects or sustainable irrigation programs could be effective adaptation options in arid and semi-arid areas. At the same time, each of these could serve as a component of a National Action Plan to combat desertification and also to promote biodiversity.

3.2. Adaption Measures

A review of potential evaluation criteria focused on the NAP Annotated Guidelines as well as for the 10th and 11th -5 year Socio-Economic Development Plans, the National Environmental Policy presented in Copenhagen Conference on Climate Change (December 2009), the National Environmental Action Plan for Conserving Biodiversity, and the National Action Plan for Combating Desertification. Stakeholders were consulted for finalizing the following set of evaluation criteria by which to evaluate each proposed adaptation measure was chosen:

- Contribution to sustainable development;
- Livelihood security of local communities;
- Poverty reduction to enhance adaptive capacity;
- Synergy with other multilateral environmental agreements; and
- Cost-effectiveness.

Stakeholder agreed that further delay in adaptation would significantly increase vulnerability of the other sectors, and/or lead to much higher adaptation costs in the future.

3.3. Challenges to NAAP Implementation

There is a range of challenges that could threaten the ultimate implementation of priority adaptation activities identified by the NAP process. Potential challenges are of various types including technical, economic, financial and institutional in nature at different levels. The major challenges include:

- Weak institutional structures and environmental legislations (poor implementation of laws and bills);
- Lack of explicit policies to facilitate the implementation NAAP recommendations;
- Lack of quality data in terms of adequate monitoring and collection, accessing databases, technical capacity to analyze and manipulate data for V&A;

- Uncertainties in regional, local climate change scenarios, and socio-economic scenarios;
- Low awareness regarding climate change and its impacts;
- Inadequate institutional, technical and financial capacity to develop, modify, or interpret existing models and methodologies, lack of financial sources to implement the adaptation measures;
- Poverty needs constrain efforts to build resilience; and
- Scarce research work on the practical application of policy measures for adapting to climate change.

The six themes of the NCI Action Plan include 16 projects. A concept Note was developed for each of the suggested projects.

The following project concepts were developed and each of the project concepts includes rationale, objectives and proposed outcomes. The time frame of each project would depend on the nature of its activities, and would range from 2 to 5 years. Detailed schedule and budget for each project will be identified upon ratification of NCI National Adaptation Action Plan for Climate Change.

The NAAP also includes a proposed monitoring, evaluation and implementation mechanism involving all stakeholders.

3.4. NCI Action Plan Themes

3.4.1. Theme one: Develop sustainable institutional coordination mechanisms

3.4.1.1. Rationale:

The efforts of environmental management are scattered among many institutions in Syria. Currently, there are several agencies with different degree of responsibility or influence with regard to environmental issues; among them are MSEA, MAAR, M Irrigation, M Electricity, M Transportation, M Oil and Mineral Wealth, M Housing, M Health, M Education; academic institutions; and various NGOs.

There is some confusion over the roles of agencies and authorities, and in other instances, lack of coordination and duplication of efforts. There is a pressing need to define specific roles and responsibilities to avoid duplication of efforts. At the same time the, legal framework is not clearly spelled out. More important, there are serious problems in enforcing environmental laws. In addition, financial constraints and lack of equipment, trained personnel and general awareness are inhibiting the consistent application and enforcement of environmental laws in Syria. This requires identification of roles for each institution and subsequently implementing training programs for the staff.

3.4.1.2. Proposed Projects

Project 1.1. Development of a sustainable coordination mechanism among institutions implementing the NCI National Adaptation Action Plan

The main aim of this project is to develop a sustainable coordination system among these institutions. Such a coordination system could be better applied through the existing networks and cooperation mechanisms or expanding them. As the mandates and requirements of the different institutions are diverse and the focus is different, it will be more realistic and practical to form thematic coordination groups that can be then overseen by a higher coordination committee formed of 6 members from the thematic committees.

Implementation mechanism:

The secretariat of the implementation mechanism will be the Council for Environmental Protection and Sustainable Development with the State Ministry for Environmental Affairs as the implementing agency.

The Climate Change National Committee:

This Committee would include members of the following stakeholders: The State Ministry for Environmental Affairs, the State Planning Commission, Ministry of Agriculture and Agrarian Reform (The General Commission for Scientific Agricultural Research, the Directorate of Planning, and the Directorate of Forestry), Ministry of Housing., Ministry of Transportation, Ministry of Higher Education, Ministry of Electricity, Ministry of Oil and Mineral Wealth, Ministry of Education, Ministry of Irrigation, Ministry of Health, Ministry of Information, Ministry of Tourism, The Central Bureau of statistics, The General Directorate of Meteorology, General Authorities, General Directorates and Research Centers, The Professional Syndicates, and NGOs.

The Scientific Consultation Committee

The scientific consultation committee shall be formed of specialists (consultants) from different fields that cover the themes of UNFCCC and the other International Environmental Conventions. The consultants should be selected based on their experiences and knowledge of the more recent information on the International Environmental Conventions. The task of the committee will be providing scientific support to other committees, playing a role in preparation of project documents based on the concept notes presented in the action plan, providing consultation and advises to the State Ministry for Environmental Affairs and to other entities involved in implementing UNFCCC.

Activities

- National assessment of lessons learned and experiences of previous coordination committees.
- Develop the final TORs and mandates of each subcommittee.
- Develop reporting systems.
- Establish a scientific/technical advisory committee.

Outcomes

- Effective coordination mechanism system for implementing the UNFCCC is developed among the stakeholder institutions.
- Technical and organizational capacity for implementing the UNFCCC are consolidated and strengthened.
- Implementation of the UNFCCC is well coordinated.

Estimated Budget

This project does not need a real budget except expenses for committees meeting, which will be covered by projects for which the meeting is intended.

Project 1.2. Strengthen the technical capacity of the UNFCCC focal point at the MSEA

This project will be based on the capacity development needs of the UNFCCC focal point at the MSEA. The first step will be to develop a stable and effective organizational structure for the functioning and coordination of the focal point to act in a synergistic manner. Once the coordination structure is established, a comprehensive program should be designed and implemented.

Objectives

- To create a sustainable and effective organizational structure for the integrated functions of the UNFCCC focal point;
- To raise the individual capacity of the focal point and the organizational capacity of the MSEA in implementing the activities of UNFCCC; and
- To create a system of direct coordination among the different stakeholders.

Activities

- Develop an organizational cooperation structure for the focal point;
- Conduct a capacity needs assessment for the focal point and the organizational system of implementing the activities of UNFCCC;
- Develop a comprehensive plan for the focal point; and
- Mobilize resources from the various ministries, organizations and departments to facilitate the implementation of the Convention.

Outcomes

- A qualified and professional Convention implementation unit (entity) is established at the MSEA
- Implementation of UNFCCC in Syria while ensuring synergies in implementation improved.
- Negotiation, networking and reporting skills by the focal point developed.

Estimated Budget

250,000 US\$.

Sustainability

The Government of Syria has heavily invested in adequate institutional capacity to handle preparation and implementation of natural resources management projects during previous years. This program will support technical, administrative and institutional coordination for the implementation of the UNFCCC.

The projects of this program will build on the existing management structures at MSEA, which will be scaled-up for administration and technical development and ensure sustainability of the functions of established coordination mechanisms and the new capacities of the UNFCCC focal point.

3.4.2. Theme Two: Develop clear and systematic integration of the UNFCCC concepts in the national policy and legislation

3.4.2.1. Rationale

Syria is moving towards integrating with the international economic system at a relatively reasonable rate, and has signed many trade and economic agreements including agricultural and industrial activities. Some agreements include articles and provisions that have direct and cumulative impacts on the environmental issues. To reduce the impact of these agreements and increase the benefits, the concepts of the UNFCCC should be integrated in the national policies, legislations and development plans of all sectors. This integration process should include a national system for assessing the impact of all agreements and a sustainable regulatory framework for a sustainable integration process.

3.4.2.2. Proposed Projects

Project 2.1. Develop a regulatory framework for systematic integration of the concepts of UNFCCC in the national policy and legislation

Implementation mechanism

This project should involve all national stakeholders involved in the implementation of UNFCCC and related to the integration process of the Convention in the national policy, legislation and development plans, which may include the legislation and planning national institutions.

Objectives

- To assess the status of the integration process of the concepts of the UNFCCC;
- To identify the policy and legislation gaps related to the concepts of the UNFCCC;
- To suggest and test the policy and legislation options to be integrated with all stakeholders; and
- To develop a national regulatory framework for the integration of the UNFCCC concepts.

Activities

- Survey of the current national legislation and development plans for the presence of UNFCCC concepts;
- Develop a national team to identify the policy and legislation gaps and suggest the policy and legislation options for concepts to be integrated;
- Test the policy options with the participation of all stakeholders and determine the suitable options to be integrated;
- Promote the policy options among the policy makers in the country;
- Conduct a training program for policy makers on issues related to the UNFCCC and its integration in the national policy legislation and development plans; and
- Develop the national regulatory framework for the integration of crosscutting issues concepts.

Outcomes

- A national development-based regulatory legislative system for the integration of the crosscutting concepts developed;
- The national rights in the UNFCCC are protected;
- The national team for the integration of international Convention developed;

- The national regulatory framework for the integration of the crosscutting concepts of the Convention is made clear;
- Qualified practitioners and legislators trained in crosscutting issues; and
- Provisions for crosscutting issues in implemented UNFCCC are developed.

Estimated Budget

250,000 US\$.

Project 2.2. Development of a policy system for assessing the impact of the economic and trade agreements on the environment

Implementation mechanism

This project should involve the wide spectrum of organizations and sectors associated with the trade negotiations and the development and implementation of trade and economic agreements. The project should be inclusive enough to involve NGOs and civil society organizations concerned with environmental protection and sustainable development. The State ministry for Environmental Affairs should be involved through its integrated licensing and EIA Directorate as well as the trade and environmental national committees.

Objectives

- To develop a practical and effective system for the application of Strategic Environmental Assessment (SEA);
- To apply the SEA system in assessing the environmental impact of currently implemented trade and economic agreements at the bilateral, regional and global levels
- To use the SEA in assessing new agreements prior to signature and assist negotiators in identification of potential environmental impacts of trade and economic agreements;
- To ensure that trade agreements are environmentally friendly and supportive of sustainable development objectives; and
- To strengthen the capacity of Syrian trade policy to protect the environment through the promotion of sustainable development

Activities

- Establish a national Strategic committee for the development of national system/guidelines for SEA;
- Develop national operational and technical directives and laws for SEA;
- Apply SEA in analysis of current trade and economic agreements;
- Conduct training programs on the application of SEA;
- Establish a national system for use of SEA in negotiations for new trade and economic agreements; and
- Seek provisions in trade agreements under which parties to those agreements strive to ensure that they do not weaken or reduce the protections afforded in national environmental laws and policies as an encouragement for trade.

Outcomes

- Procedural and technical SEA guidelines and directives are developed and made functional;
- A policy system for Strategic environmental assessment for economic and developmental agreements on the environment is developed and
- Newly negotiated trade agreements are made subject to participatory and transparent SEA(s).

Estimated budget

300,000 US\$.

Program Sustainability

The program is expected to be institutionally sustainable. The projects will follow already defined national plans and will work within national institutions without creating new institutions or decision-making bodies. Thus, no additional institutions or managerial structures requiring additional financing will be created by the project.

Program activities build on the country's ongoing environmental management programs as well as national action programs to combat desertification and the Strategy for biodiversity and climate change. The capacity building and training program will be directed toward the existing staff and it will be on-job training in most cases. This will greatly increase the prospects for institutional sustainability of the project by having project activities closely connected to national frameworks.

3.4.3. Theme Three. Sustainable development of agricultural and water resources**3.4.3.1. Rationale**

Agriculture plays a vital role in the economy of the country, absorbs a large portion of the work force, provides food and fiber, and generates foreign currency through exports. Agriculture is directly affected by climate change and rural communities are consequently affected. Repeated drought strikes, water shortage and pollution, and low profile of use of modern technologies in agricultural practices, water use especially irrigation, processing and marketing are major challenges for sustainable agricultural production. It is essential for developing sustainable agricultural programs that the broad vision be pursued in coordination with other national environmental strategies adaptation in order to exploit synergies as they arise.

Drought early warning systems, contingency plans, food security systems, alternative livelihood projects or sustainable irrigation programs could be effective adaptation options in the country. At the same time, each of these could serve as a component of the National Action Plan to Combat Desertification and also to promote Biodiversity.

The NAAP process confirmed that climate change issues are indeed closely linked to ongoing national efforts related to the UN Convention Biodiversity (CBD) and the UN Convention on Combating Desertification (CCD).

3.4.3.2. Proposed Projects**Project 3.1. Integrated Agricultural production**Implementation Mechanism

Proper agricultural production systems and practices are applied in the different sites and for different types of national needs. Pulses and forage production is a major component in different rotations and livestock is essential in many production systems. Integrated agricultural systems would be anticipated to increase production by 30%. MAAR and all other stakeholders are responsible for implementation.

Objectives

The major goal is the enhancement of sustainable income from agriculture through improved productivity per unit area.

Main objectives are:

- To development of land use policies;
- To ensure sustainable agricultural production;
- To achieve sustainable use of water and soil resources;
- To combat desertification and conserve biodiversity; and
- To improve agricultural production in general.

Activities

- Develop long and midterm policies and mechanisms to establish land use policies according to the potentials of lands according to soil and water resources in each area and to needs of the food security of the country;
- Develop the farm system according to land use policies;
- Improve successful traditional agricultural practices;
- Develop agricultural practices according to land use; and
- Enhance integration of livestock-agricultural production.

Outcomes

- Land use policies developed;
- Agricultural production improved and sustained;
- Water, soil resources and biodiversity conserved; and
- Desertification limited.

Estimated budget

3,000,000 \$ US

Project 3.2. Conservation and rational use of water resources including modern irrigation

Implementation Mechanism

Irrigated areas have increased from 451 000 h in 1970 to over 1402 000 h in 2006. Availability of water resources dramatically changed leading to changes in irrigated areas on each of the water resources. Irrigated areas from surface water resources decreased 40 % of the total while irrigated areas dependant on ground water increased up to over 59%. Ground water was depleted to an alarming stage in the basins of upper and mid Orentus, Khabour, Barada, and Yarmouk. Moreover, water quality was affected in certain areas.

To overcome this problem and the problem of low production, the GOS launched the Project on Transfer to Modern Irrigation (PTMI) in 2000 and to be implemented by MAAR. The project aimed at increased agricultural productivity and production and conservation of water and soil resources.

PTMI also aimed at increasing water efficiency use by 45% and reduce loss of water by 70% from the all water systems. The major expected results have been saving 3.795 billion m³ of water to overcome the gap between water requirements and resources.

Cost of production would decrease while net revenues significantly increase for all crops at the local and the national levels. The PTMI faces many institutional, social and technical challenges which lead to slow implementation (less than 25%) of its activities.

MAAR is the implementing agency for this project GCSAR shall also be involved in developing research activities for the best implementation practices. The Ministry of Industry shall be involved in supervising the manufacturing of all equipment needed in addition to their quality control.

Objectives

To strengthen the existing PTMI achieve its objectives:

- Increased agricultural productivity and production;
- Conservation of water resources;
- Conservation of soil resources and combating desertification; and
- Alleviation of drought impacts.

Activities

- Conduct studies on challenges hindering the implementation of PTMI; and
- Promote use of modern irrigation systems at the level of the small farmer.

Outcomes

- Implementation of PTMI enhanced;
- Agricultural production increased;
- Water and soil resources conserved;
- Desertification limited; and
- Drought impacts alleviated.

Estimated budget

500,000 \$ US.

Program Sustainability

The Project on Transfer of Modern Irrigation (PTMI) is already ongoing and is being financed. It is one of the strategic projects to enhance agricultural production, alleviate poverty and combat desertification. The project directly fits the already defined national plans and will work within national institutions without creating new institutions or decision-making bodies. Thus, no additional institutions or managerial structures requiring additional financing will be created by the project.

Moreover, all activities of the project build on the country's ongoing environmental management programs as well as national action programs to combat desertification and the Strategy for biodiversity and climate change. This will greatly increase the prospects for institutional sustainability of the project by having project activities closely connected to national frameworks.

Project 3.3. Develop and implement easily accessible drought forecast and drought monitoring information systems to improve drought preparedness.

Implementation Mechanism

Drought reduces agricultural production, which leads to a reduction in the total value of agricultural output and income, and damages national economic growth. At the community level, drought causes loss of crops, livestock and, in severe cases, leads to chronic food shortages and famines. The migration of rural people from drought stricken areas to cities, in search of food and employment, can add to the pressure on urban resources causing social problems. The actions that farmers take in tackling drought challenges are regulated by their socio-economic environment, knowledge and experience. The social and economical possibilities and constraints that they face also determine the way in which they cope with drought. Hence, drought management should be closely associated with household food security and be linked to ensuring food supply and developing the human resources necessary for sustainable agricultural development.

Farmers, herders and other stakeholders have to commit resources each year before the commencement of key rainfall outcomes. For example, decisions about planting crops (variety, date of planting, seeding rate, fertilization, etc.) usually have to be made at the beginning of the wet season, before knowledge about rainfall quantities and distribution is available. The ability to provide early warning drought forecasts would represent a powerful tool for avoiding many of the economic costs associated with the misallocation of resources, particularly in combination with a well functioning response farming system.

Reliable drought forecasts could also enable governments and relief agencies to position themselves each year for more effective and cost efficient drought interventions.

It is therefore important to develop drought forecast and monitoring information systems that can be easily accessed by all stakeholders involved in drought preparedness. Requirements on meteorological networks and remote sensing techniques, data acquisition, storage and analysis, GIS, and access to information (dissemination) have to be identified and satisfied.

MAAR already has the basis of this project and there is need to reactivate it in cooperation with the General Authority of Metrology, the General Authority of Remote Sensing, the State Ministry for Environmental Affairs and other stakeholders.

Objectives

- To strengthen the ongoing projects on preparedness for drought strikes.
- To develop long term strategy to mitigate the bio-physical and socio-economic impacts of drought strikes.

Activities

Develop studies and mechanisms to implement the following measures:

- 1) Climatic prediction and early-warning systems.
- 2) Adaptation of production systems to match the bio-physical and socio-economic environment (e.g. crop diversification, cropping patterns, etc).
- 3) Application of agro-climatic information in crop improvement research for better targeting of crop varieties and management to specific agro-ecological environments.
- 4) Crop manipulation and crop management for improved water- use efficiency and drought tolerance.

- 5) Improved management of livestock and rangelands.
- 6) Soil and water conservation and watershed management including water harvesting.
- 7) Efficient and sustainable use of different alternative water resources (rain, groundwater, surface water, non-conventional water sources).
- 8) Policy and institutional measures that enable implementation of drought mitigation strategies and practices and can provide necessary assistance in case of disaster.
- 9) Animal and crop insurance.
- 10) Establishment of special emergency funds.
- 11) Capacity building.

Outcomes

- Ongoing projects on preparedness for drought strikes strengthened;
- Long term strategy to mitigate the bio-physical and socio-economic impacts of drought strikes developed; and
- Bio-physical and socio-economical impacts of drought alleviated.

Estimated budget

1,000,000 \$ US.

Project 3.4. Development of the investment environment in agriculture and agribusiness.

Implementation Mechanism

The existing regime for investment, including the agribusiness sector, has several drawbacks that have so far impeded a more vigorous and sustainable process of investment and growth. The general problem is that the regime grants special temporary benefits for new investments, without altering much the general macroeconomic and institutional environment, or making those benefits permanent. This encourages the pursuit of short-term advantages, but hardly promotes long-term growth. The Ministries of Finance, Agriculture, MSEA, Industry, in addition to SPC and the private sector are the concerned parties for implementing this program.

Objectives

- To promote investment in agribusiness;
- To facilitate the development of cooperative enterprises;
- To facilitate development of rural micro-finance institutions to expand the use of credit in the countryside;
- To improve and decentralize agricultural planning;
- To promote marketing of agricultural products;
- To foster on-farm investment for modernization of irrigation systems;
- To adjust the laws of agricultural relations; and
- To improve the information system and the provision of investment studies to comply with the international standards of marketing agricultural products.

Activities

- Facilitate access to land, especially publicly owned land, including the development of industrial zones provided with all basic services (mainly electricity and water);
- Reduce inefficiencies and overhead costs, implying administrative reform of the public sector, simplification of administrative procedures, and improvements in basic infrastructure and services.

- Introduce more initiative and innovation in the strategic-crop sector;
- Promote foreign investment in agricultural export products. Foreign capital and technology are needed to expand production of specific high quality agricultural products, especially fruit, vegetable and dairy, for export to other markets;
- Provide governmental studies about the projects required for economic growth, which are beneficial for investors, and provisional studies related to these projects to help investors in the decision making process; and
- Attract foreign, Arab, and Syrian capital by providing more incentives.

Outcomes

- Investment in agribusiness promoted;
- Cooperative enterprises Developed;
- Rural micro-finance institutions developed and the use of credit in the countryside expanded;
- Agricultural planning improved and decentralized;
- Marketing of agricultural products promoted;
- On-farm investment for modernization of irrigation systems fostered;
- Laws of agricultural relations adjusted; and
- Information system and the provision of investment studies to comply with the international standards of marketing agricultural products improved.

Estimated budget

1,000,000 \$ US.

Program Sustainability

The Government of Syria has been heavily investing in agriculture which contributes over 37% to the national net income. The project will follow already defined national plans and will work within national institutions without creating new institutions or decision-making bodies. Thus, no additional institutions or managerial structures requiring additional financing will be created by the project.

Program activities are build on the ongoing environmental management programs as well as national action programs to combat desertification and the strategy for biodiversity and climate change. This will greatly increase the prospects for institutional sustainability of the project by having project activities closely connected to national frameworks.

Sustainability of this program also stems from the fact that the GOS is intending to promote the social market through liberalizing prices, encouraging investment in the agribusiness sector and gradually decentralizing agricultural planning. Moreover, this program fits into the socio economic plans and does not need the establishment of new institutions or organizational bodies for implementation.

3.4.4. Theme Four. Capacity development, knowledge management, networking, outreach and awareness

The knowledge and communication barriers facing the proper implementation of the UNFCCC and other UN Conventions are closely related and have been identified by the three thematic profiles together. The knowledge portfolio was divided into communication, data management, networking and outreach systems that all can be grouped together under the umbrella of "knowledge management".

The knowledge barrier in Syria is the most important because of the limited information and weak knowledge generation and processing, especially regarding environmental

management. Even if some of the information is available, its accessibility and dissemination to the target stakeholders is still very weak and largely does not exist. On the other hand, it has been proven that sound decision-making is enabled by accurate, complete and relevant information, where knowledge management system can play a key role in supporting the management staff with the needed information.

A common thread running through UNFCCC and the other UN Conventions is the need for public awareness and education about the Conventions and the issues that they seek to address. In the thematic assessment reports, which formed the platform for the crosscutting review, public awareness is cited as a key issue for implementation of Syria's obligations under the Conventions. It is important to understand that the country needs to take preventive and mitigation action concerning the environment, to not only meet its obligations under the Conventions, but also for the protection and conservation of our natural resources base which is critical to sustainable development.

Moreover, implementation of the UNFCCC requires development of practical education and training programs, which are major cross-cutting for successful environmental program for capacity building. The main entry point for education and awareness could be the adaptation measures and plans for different sectors and assimilating and processing new practical knowledge resources on climate change adaptation and mitigation measures and clean development mechanism especially project design and requirements. Other entry points for education, awareness and training could be based on identifying socio-economic impacts of climate change in addition to major environmental impacts. Education and training program for climate change should be based on the national priorities and capacity building constraints identified and should be looked at as a tool and not an end by itself.

Project 4.1. Develop Sustainable Awareness on Adaptation to Climate Change

Implementation Mechanism

This project should be implemented by a coalition of three organizations. The ministry responsible for public education in Syria would be the Ministry of Education in specific, an NGO with an excellent record in environmental awareness activities, and a university that will take the lead in introducing the concepts of the UNFCCC in its curriculum and be committed. The coalition could increase in membership with the support provided by the MSEA (Focal point of the UNFCCC), the Ministry of High Education (for planning the modification of university courses), the Ministry of Information and another NGO that can assist in awareness activities. This will be the first awareness project to act on the three issues of biodiversity, climate change and desertification together.

Objectives

- Promote community-based participatory planning and management of climate change issues at local levels through enhanced public awareness.
- Promote public awareness on various aspects of climate change issues including adaptation.
- Expand awareness of youth organizations to cover climate change issues.
- Improve professional skills of teachers and university lecturers in producing and disseminating awareness materials on climate change issues.

Activities

- Establish the project's coordination system;

- Survey and analysis of all education and awareness approaches and guidelines developed by the UNFCCC;
- Identify a national assessment of all previous and existing awareness and education projects with gap analysis and lessons learned;
- Select contents to be used in the awareness and education plans derived from the conventions and adapted to national conditions;
- Develop awareness Strategy with used modules and awareness tools;
- Set up pre-service and in-service training programs for all teachers, administrators, and educational planners;
- Prepare publications and conduct seminars and workshops for schools, universities and communities to spread knowledge and awareness to the targeted communities and their schools and community centers;
- Develop new concepts in the curricula; and
- Develop the new university course outlines, resources and planning for implementing the new courses.

Outcomes

- Public role in planning, executing and monitoring of climate change issues at community levels achieved;
- Awareness on climate change impacts and adaptation of the target sectors among policy makers, NGOs, youth clubs, and local communities enhanced; and
- Audio-visual materials produced and disseminated.

Estimated budget

800,000 \$ US.

Project 4.2. Establishment and Maintaining of Climate Change Database

Rationale

The adverse impacts and implications of climate change on people and the quality of their livelihood require enormous efforts and actions to be undertaken at local, national, regional and international level. The availability and accessibility of climate change related information is the essential element to know, to deal with the consequences of climate impacts, and to conduct adaptation activities. There are a lot of information and reports relevant to climate change, but they are scattered in different places and not accessible in most of the cases. This situation makes it quite difficult and challenging to inform people and make them aware on how to deal and adopt the appropriate responses to climate change.

Establishment of climate change data base is essential to facilitate information sharing and accessibility to national data, and to create links to the regional and international sources of information.

Objectives

- To establish an accessible database for climate change;
- To strengthen the country capacity to aggregate, analyze, and disseminate climate change information; and
- To improve capacity in producing and interpreting climate modeling and scenarios.

Activities

- Procurement of materials, hardware and software including the proper soft ware systems;
- Training on data collection, analysis and dissemination;
- Collection of relevant data and information;
- Establishment of the database;
- Create links to national, regional and international data sources;
- Documentation of climate extreme events, review and update data; and
- Developing and preparing reports on climate change related activities.

Outcomes

- Accessible data source established;
- Data in different forms including tables, maps, charts etc available;
- Knowledge and awareness on climate change and adaptation enhanced;
- Capacities on research and information sharing strengthened; and
- Periodical reports on the status of climate change and related activities are prepared.

Estimated Budget

400,000 \$ US

3.4.5. Theme Five: Develop means for technology transfer.

Project 5.1. Develop agricultural and water research and extension Implementation Mechanism

Agricultural research and extension in all sectors and at all levels should include traditional crop breeding and the use of modern technologies to develop varieties that are tolerant to adverse conditions of climate changes and drought, and soil and water salinity among other adverse conditions.

Application of traditional crop breeding system is adopted and many varieties of wheat, barley and cotton have been developed. However, this process is slow.

Modern technologies are very expensive and difficult to attain to develop new crop varieties at this stage. The system needs regional efforts since all the Arab countries face the same difficulties in attaining food security, and share similar challenges of water shortage, land degradation, climate change and drought, lack of coordination among institutions and experts, etc.

It is anticipated that when new crop varieties are developed and spread, agricultural production would be sufficient under the adverse conditions of climate change.

MAAR, the Ministry of Irrigation, the Ministry of High Education and the related stakeholders are the key implementing agencies.

Objectives

The major goal is to enhance sustainable agricultural production and the conservation of water resources through the development of extension packages containing the proper technologies.

Activities

- Develop and adopt heat tolerant cultivars for both irrigated and rain fed regions;
- Change crop practices (optimum sowing date, cultivars, water needs and plant density);

- Increase rainfall efficiency through applying conservation farming practices including minimum tillage, strip cropping, building contour terraces and contour plowing;
- Construct water harvesting structures to store rainfall water to be used during prolonged droughts;
- Improve irrigation management. The application of irrigation at critical growth periods of the crop is important to maintain high yield; and
- Develop packages to promote and apply the developed and adopted technologies.

Outcomes

- Agricultural production enhanced.
- Water resources conserved.

Estimated Budget

3,000,000 \$ US.

Project 5.2. Development of a technology transfer system and capacity building for energy efficiency and renewable energy

A special attention was apparent in the INC process on adopting energy efficiency and renewable energy technologies through the UNFCCC and other technology transfer systems as a basic requirement for adaptation and mitigation measures and as an urgent process for restructuring the energy sector to face the rise in oil prices.

Implementation mechanism

Energy policy makers should implement this project: Ministry of Electricity, Ministry of Oil and Mineral Wealth, relevant research centers, private sector, and the State Ministry of Environmental Affairs Environment.

Objectives

- To develop a comprehensive technology inventory and needs assessments for energy efficiency and renewable energy;
- To identify required technology through a gap analysis of existing technologies in energy efficiency;
- To identify potential technology transfer routes;
- To assess the current national and global legislative framework regarding technology transfer and intellectual property right related to energy efficiency and renewable energies;
- To design realistic and well-articulated technology transfer programs for Syria;
- To create an enabling legislative and administrative environment for technology transfer in sustainable energy; and
- To develop a system of incentives for companies making investments in renewable energies.

Activities

- Survey and analysis of all technology transfer guidelines and approaches developed in the UNFCCC, Kyoto Protocol and Copenhagen conference is conducted;
- Conduct a thorough national technology assessment exercise for energy efficiency and renewable energies;
- Identify gaps in technologies available nationally;
- Identify the required technology;

- Assess the national legislative and administrative system for technology transfer and identify needed modifications to overcome legislative and financial barriers;
- Create a database of required, appropriate energy efficiency and renewable energy technologies and its sources that is continuously updated;
- Explore potential technology transfer routes and partnerships;
- Develop a national plan for transfer of appropriate priority needs technologies and their sources with adequate enabling environment;
- Develop a capacity building program related to the new technologies;
- Combine standards, tools, and training in making energy efficiency an integral part of corporate management systems;
- Capacity building on the development and implementation of government-sponsored recognition schemes based on verified energy savings;
- Organize workshops involving all the concerned institutions with the objective of presenting the appropriate approaches to assess technology transfer needs;
- Provide financial and non-financial incentives for the diffusion of relevant technologies; and
- Collect information on cost effective technologies (energy efficient, renewable energy technologies).

Outcomes

- National needs in technology transfer for energy efficiency and renewable energy are identified;
- Regional and global technology transfer routes are identified;
- Database on new technologies is developed and updated;
- An enabling legislative and administrative environment for technology transfer is established;
- Technology transfer agreements, partnerships and initiatives are designed;
- A national technology capacity-building plan for energy efficiency and renewable energy is developed;
- Barriers against technology transfer are removed;
- Guidelines for energy audit and energy efficiency programs are developed and implemented; and
- System of incentives for companies making investments in renewable energy is introduced

Estimated Budget

750,000 US \$.

Project 5.2. Development of knowledge management and networking

Implementation Mechanism

There is a clear need at the national level to develop a knowledge management and networking system that would facilitate the acquisition, processing and dissemination of technical knowledge on climate change issues across organizations and between various professionals in the field.

An existing data management entity linked to UNFCCC themes can act as the custodian to this project by enhancing its infrastructure and knowledge management (KM) capacity to host the KM system. Other key stakeholders should join, as equal status partners, to provide the information and the necessary processing required. The implementation system

can include the data management system, governmental organizations and academic/research centers.

Objectives

- To establish a national knowledge management system for the collection, processing and distribution of information related to the three conventions;
- To contribute to the use of the KM system in enhanced informed decision-making and better awareness programs; and
- To develop a set of national indicators for the monitoring of state of biodiversity, desertification and climate change.

Activities

- Conduct assessment to identify gaps and priorities in knowledge management needs for related institutions;
- Identify the content of the KM system and sources of information;
- Select proper knowledge management channels and systems based on existing ones that can be upgraded;
- Purchase and develop required software and connectivity systems;
- Create an open source accessible system for the collection and retrieval of information in the form of a database or other KM media;
- Define roles and responsibilities on the addition and use of existing information and sorting all issues related to intellectual property rights;
- Identify suitable indicators and processes of data generation for combined monitoring of biodiversity, desertification and climate change indicator systems; and
- Train key personnel directly linked with the design, management and use of the KM system.

Outcomes

- A comprehensive, sustainable and maintained KM system to serve all stakeholders is operational and accessible;
- Knowledge about the themes and updated channeling of new information improved;
- A national indicator system with clear sources of monitoring information for the three themes of climate change, biodiversity and desertification is established;
- Personnel in the use and management of the KM system trained; and
- Multi-media and modern software knowledge products developed and made accessible.

Estimated budget

500 000 \$ US

Project 5.3. Develop linkages between policy-making and research, and national policies of technology transfer at the regional and international levels

Implementation mechanism

The linkages between policy makers and research results are weak. Most efforts conducted in national scientific research centers and regional and international bodies in Syria on energy and climate change issues do not find their way to the policy-making and management systems for a reason or another. A capacity development program for creating an enabling environment for linking scientific research to policy making is one of the major priorities in energy management and climate change. The research capacity-building component should be focused on systematic observations and collecting, managing and

utilizing activity data and emission factors as well as capacity to establish a sustainable Observation System on Climate Change. Moreover, fulfillment of obligations under the UNFCCC, financial and technological support is necessary to insure technology transfer such as building institutional capacity, establishing/ strengthening research centers and funding demonstration projects that mitigate climate changes effect. Other capacity requirements include capacity to identify, adapt and disseminate relevant climate change safe technologies and capacity to coordinate the various technology transfer initiatives and to report on the achievements. Based on the above, the LFA of this capacity constraint suggested the following actions:

Objectives

- Identify and promote linkage mechanisms between research and policy making to implement the climate change convention.
- Adopt linkage mechanisms between research, systematic observation, and policy making to implement the climate change convention by stakeholders.

Activities

- Develop a system for integrated inventory of GHG emissions and adaptation measures within the policy making process;
- Conduct comprehensive inventory of current applied technology.
- Conduct national technology needs assessment study;
- Promote environmentally sound technologies to implement Climate Change Convention;
- Adopt and enforce a legal, regulatory and institutional framework that coordinates the national efforts for technology transfer;
- Develop technology transfer projects based on financial opportunities; and
- Adopt environmentally sound Climate Change technology by stakeholders.

Outcomes

- Linkage mechanisms between research and policy making to implement the climate change convention identified and promoted.
- Linkage mechanisms between research, systematic observation, and policy making to implement the climate change convention by stakeholders adopted.

Estimated Budget

500 000 \$ US

Project 5.4. Create environment for renewable energy and develop capacity for rational and efficient uses of energy

Implementation Mechanism

Development in energy policies and the feasibility of alternative energies is growing at slow pace in Syria. However, recent economic developments should put more emphasis on developing renewable energy resources (such as wind and solar) in the national energy mix. Capacity development in the field of systematic and institutional aspects of renewable energy is considered one of the main priorities.

To minimize GHG emissions, changes in economic development and energy policies, and fulfilling the requirements of the UNFCCC need to be addressed through a strong program for capacity building, and to emphasize more on developing renewable energy options. The national focus on energy efficiency will be a positive driving force in many sectors

including energy, agriculture, industry, housing and transport, and a practical capacity development program should be associated with this transition. This approach needs development of technologies and practices for energy efficiency at all levels of energy consumption.

All stakeholders especially the Ministries of Industry, Transport, Housing, Oil and mineral Wealth and Agriculture in addition to research centers, the private sector and NGOs would be involved..

Objectives

- Promote and adopt energy efficiency programs in all sectors;
- Develop and implement guidelines for energy audit and energy efficiency programs.
- Create financial incentives for projects using energy saving mechanisms.

Activities

- Conduct awareness program for prompting the utilization of renewable energy resources.
- Introduce a system of incentives for companies making investments in renewable energy projects.

Outcomes

- Energy efficiency programs in all sectors promoted and adopted;
- Guidelines for energy audit and energy efficiency programs developed and implemented; and
- Financial incentives for projects using energy saving mechanisms created.

Estimated Budget

150 000 \$ US.

Program Sustainability

This is the most sustainable and self-improvement program, and will be within the priorities of the national plans and will work within national institutions without creating new instances or decision-making bodies. The program activities will also build on the country's ongoing environmental management programs as well as national action programs to combat desertification and the Strategy for biodiversity. This will greatly increase the prospects for institutional sustainability of the project by having project activities closely connected to national frameworks. Moreover, the practices to be promoted will be compatible with the average level of human and financial capital present in communities. Transfer of knowledge and dissemination of technologies associated with the project's capacity building and on-the-ground demonstrations should strengthen beneficiaries towards improved and more stable resource based livelihoods and self-reliance.

The individual projects will be based on knowledge, which is a non-depleting resource that will be always generated, processed and maintained. The outcome of the three projects should be combined to produce a sustainable source of information and a system of intellectual development that will be sustainable by the sustainability of knowledge.

3.4.6. Theme 6. Local communities' empowerment and participation

3.4.6.1. Rationale

Local communities are the ultimate the different development programs and their empowerment through training, institutional and technical capacity development and financial resources development is a key factor for the success of any natural resources and environmental management programs. This requires several fundamental changes in the ways dealt with local community support such as: (i) Give more management responsibilities to local communities; (ii) Improve operational linkages between local community and public staff; (iii) Simplify diagnostic and planning procedures for local community development; (iv) Flexibility in terms of the activities to be supported; and (v) increased number of field teams to expand coverage. To create such changes, the main principle of this program is that the communities, including the rural poor, would be empowered to work out their development programs and Action Plans according to their own needs and priorities. This program aims at increasing the community ownership and responsibility for infrastructure and eventually will enhance the sustainability of the development effort and adoption of the UNFCCC and the other Rio Conventions in Syria.

Sustainable impact after completion of a basic investment is difficult to achieve unless there is local participation and acceptance by both the beneficiaries and local communities. Therefore, adoption of Rio Conventions cannot be expected unless communities assume responsibility for the management of their natural resources.

The benefit of this project will be the tendency to integrate biodiversity conservation and sustainable use with sustainable land management approaches and introducing adaptation to climate change at the community level with combined results benefiting the three Conventions together.

3.4.6.2. Proposed Projects

Project 6.1. Development and implementation of a comprehensive capacity building and innovation program for community management of natural resources based on traditional knowledge

Implementation mechanism

This project should be implemented by mobilizing all networks and institutions with direct linkages to community action. The State Ministry for Environmental Affairs and the Ministry of Agriculture and Agrarian Reform should be closely involved with the implementation of community-based initiatives. One of the main partners of this project would be the Non Governmental Organizations (NGOs) and Community Based Organizations (CBOs).

Objectives

- To increase the technical and administrative capacity of CBOs in community management of natural resources;
- To demonstrate the implementation of community-based projects linking biodiversity conservation and sustainable use with sustainable land management and adaptation to climate change;
- To empower the communities to utilize traditional knowledge in natural resource management with proper conservation of their property rights; and

- To develop a practical framework based on evidence on the integration of biodiversity conservation and sustainable land management with poverty alleviation.

Activities

- Document traditional and local knowledge and practices of farmers in land and resources management and biodiversity and incorporate in the development of innovations and the application of new technologies;
- Develop database for traditional knowledge and its uses;
- Provide training and awareness raising to understand and up-take knowledge generating from local community and understand the impact of environment and natural resources degradation on community well-being;
- Documenting success story of community management linked to poverty reduction and sustainable livelihoods in local communities;
- Strengthen the capacities of community organizations to assume various developmental activities such as land rehabilitation, forestation, water harvesting and input supply;
- Facilitate dialogue on key policy issues such as land tenure impacting on natural resources management through the development of permanent consultation and negotiation processes between local communities, national policy-makers and research community;
- Develop modules of community management of natural resources based on national, regional and global experiences;
- Conduct capacity-building initiatives on community management in the specific linkages between biodiversity conservation and land management;
- Apply a community approach where the community individuals, and their organizations would play an integral role to promote sustainable utilization of natural resources; and
- Design a community action toolkit based on experiences with special focus on the gender and poverty reduction dimensions of community management.

Outcomes

- Technical and administrative capacity of CBOs in community management of natural resources is enhanced;
- Implementation of community-based projects linking biodiversity conservation and sustainable use with sustainable land management and adaptation to climate change is evident through demonstration projects;
- Communities are empowered to utilize traditional knowledge in natural resource management with proper conservation of their property rights;
- A practical framework based on evidence on the integration of biodiversity conservation and sustainable land management with poverty alleviation is developed;
- A package of community empowerment actions toolkit linking poverty reduction and gender to community management is developed.

Estimated Budget

500,000 US \$.

Sustainability

The program is expected to be institutionally and socio-economically sustainable. At the institutional level, the project will follow already defined national plans and will work

within national institutions without creating new instances or decision-making bodies. Thus, no additional institutions or management structures requiring additional financing will be created by the project.

The practices to be promoted will also be compatible with the average level of human and financial capital present in communities. The community participation through their empowerment should strengthen beneficiaries towards improved and more stable resource based livelihoods and self-reliance.

The program will strengthen the enabling environment through the community empowerment so that Syria can effectively implement its commitments for the implementation of the UN Convention to Combat Desertification, Climate Change, and Biodiversity.

The proposed program is aligned with the GEF Strategic Approach to support community empowerment in that it will address needs which have been identified as priorities by the community and which are consistent with those identified by the Rio Conventions.

3.5. A Mechanism for Implementation, Monitoring and Evaluation

The Government of Syria has issued sufficient policies and legislations to regulate agricultural production, food security, environment, trade, marketing, fiscal, water resources, and investment. However, there is need for proper implementation of such policies and legislations in order to overcome all challenges including low precipitation and higher temperatures due to drought strikes and climate change.

Each of the recommended items in this action plan needs a robust and effective implementation mechanism based on institutional coordination and transparency.

The following mechanism is hereby suggested. A national committee should be established and include effective representatives of all stakeholders of all projects and activities related to vulnerability of the agricultural, water and environmental sectors. The tasks of this committee include:

- Overall coordination of the implementation of all the projects and activities.
- Integrating the priorities and requirements for the implementation of the projects and activities in the strategic planning of each stakeholder's institution/ organization.
- Overall supervision and guidance of the implementation of the National Adaptation Action Plan of each related project.

A Scientific Advisory Committee (SAC) is also suggested. The SAC should be composed of 15-20 profound scientists/ professionals selected by merit with proven experience and updated knowledge on the UNFCCC and other UN conventions, as well as the latest applied technologies in the different fields. This committee will act as a backstopping and advisory body to the National Committee and will be active in the formulation of full proposals based on the project concepts identified in the Action Plan. The SAC will also provide advice and consultation to the related institutions involved in implementation of the activities.

According to the above mechanisms the following Monitoring and Evaluation Plan is suggested:

- 1) The TOR's of each project and activity should be developed and discussed within these committees.
- 2) Develop Indicators for each project; three types of indicators can be developed:

- Implementation indicators.
 - Performance indicators.
 - Impact indicators.
- 3) Reporting system for the different committees and the units of the projects management should be identified.

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5. Annexes

Annex I. Definitions.

1. "Climate change" means a change of climate which is attributed 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 time periods.
2. "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.
3. "Climate system" means the totality of the atmosphere, hydrosphere, biosphere and geosphere and their interactions.
4. "Emissions" means the release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time.
5. "Greenhouse gases" means those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emits infrared radiation.
6. "Regional economic integration organization" means an organization constituted by sovereign States of a given region which has competence in respect of matters governed by this Convention or its protocols and has been duly authorized, in accordance with its internal procedures, to sign, ratify, accept, approve or accede to the instruments concerned.
7. "Reservoir" means a component or components of the climate system where a greenhouse gas or a precursor of a greenhouse gas is stored.
8. "Sink" means any process, activity or mechanism which removes a greenhouse gas, an aerosol or a precursor of a greenhouse gas from the atmosphere.
9. "Source" means any process or activity which releases a greenhouse gas, an aerosol or a precursor of a greenhouse gas into the atmosphere.
10. Adaptation includes all activities that help people and ecosystems adjust and reduce their vulnerability to the impact of climate change. There is no universal way to adapt; specific measures need to be tailored to specific contexts. Traditionally, agriculture was an adaptive activity to climate variations. Today, unsustainable land practices are no longer viable. Good adaptation strategies should build on sustainable development strategies.
11. Mitigation aims at reducing greenhouse gases or enhancing the ability of nature, in particular forests, to absorb them. Rich developed countries have been the main producers of greenhouse gases and must now take the lead in reducing emissions.

Annex II. UN Framework Convention on Climate Change (UNFCCC).

The agreement was adopted in the (Earth Summit) Conference of the United Nations in Rio de Janeiro in Brazil in 1992. The agreement went into effect in 1994. The number of countries, which ratified the agreement, was 190. Syria signed and ratified the agreement in 1996, and went into effect in 2005.

Article 2 of the Convention states the objective, which is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level (according to 1995 levels) that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a timeframe 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.

Commitments of industrial, rich nations include modification of policies and measures in the fields of energy conservation; reducing green gas emissions; providing a positive example of leadership and development in the fields of global environment protection. Commitments also include providing financial support to empower developing countries in application of activities and projects aiming at reducing greenhouse gas emissions; helping these countries to adapt to the potential impacts of climate change; taking all possible practical measures to encourage transfer of environmentally friendly technology to developing countries.

Commitments of developing countries are limited to preparing National Communication about emissions from sectors: energy, transportation, industry, agriculture, municipalities, and housing. This commitment is present in several articles of the Convention (4, 5, 6, and 12). Other non-binding activities required from developing countries include integration of climate change policies in the national policies; implementing education and awareness programs; and provision of scientific research and information exchange.

The treaty contains general articles that require the parties to encourage scientific research on monitoring gas emissions, and determining impacts of climate change on the parties. The general articles of the treaty also concentrate on capacity building, awareness, education, and exchange of information relevant to climate change.

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 achieved within a time frame 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.

Obligations of Parties to UNCCD

- Adoption of an integrated approach to address the physical, biological and socio-economic aspects to combat desertification;
- Integrating issues of combating desertification into all national development policies, particularly in strategies for poverty eradication.
- Allocating sufficient funds for the efforts of combating desertification, and regarding that as a national priority in development basis.
- Development of a National Strategy and Action Plan for combating desertification in a participatory approach, with special concentration on integrated management for desertification-threatened ecosystems.
- Development of regional and international partnership for combating desertification and exchange of knowledge and expertise in this field.

- Development of international cooperation in the fields of combating desertification through practical programs and exchange of technology and expertise.
- Collection, documentation and analysis of information, technology, and work relevant to combating desertification and information exchange on local, regional and international levels.
- Providing support for research, training and education in the fields of combating desertification and sustainable management of lands with special attention to the needs of local communities.
- Development, transfer and adoption of technologies appropriate to local conditions for combating desertification.
- Concentration on capacity building, education, and awareness.

Annex III. Enabling activities for Preparation of Syria's initial National Communication to UNFCCC

National communication includes the program of GHG Mitigations and Programs of Adaptations with the climate changes. The report also include information About the Millennium Development Goals (MDGs).

Activities

- 1) Specify the National Circumstances.
- 2) Green house gases emissions inventory.
- 3) Programs to measures adaptation with Climate Changes.
- 4) Programs to measure the mitigation of the GHG emissions.
- 5) Identify the constraints and gaps (Capacity, financial and technical).
- 6) Initial National Communication.

Expected outcomes

- Prepares reports related to the main activities
- Public outreach and the engagement of the stakeholders
- Raising awareness and public knowledge about the climate change issues, to be taken into consideration while setting national strategies and policies.

The project is implemented in the ministry of local administration and Environment (MLAE)/General Commission of Environmental Affairs (GCEA) - The Ministry of State for Environment affairs (MSEA) now, with collaboration of the Global Environmental Facility (GEF) and United Nation Development Program (UNDP).

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