

Social and Economic Impact of Climate Change in Syria



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SOCIOECONOMIC IMPACTS OF CLIMATE CHANGE IN SYRIA

(INC-SY_V&A_ Socioeconomic impacts -En)

National Project Director:

Dr. Yousef Meslmani

info@inc-sy.org

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Study Team:

Dr. Yousef Meslmani	National Project Director
Eng. Mohamad Khazma	V&A Team Member

Steering Committee:

Headed by Eng. Hilal Alatrash Minister of Local Administration and Environment, and membership of:

Mr. Ismail Ould Cheikh Ahmed	United Nations Resident Coordinator and UNDP Resident Representative in Syria.
Dr. Taysir Raddawi	Head of the Syrian's State Planning Commission.
Eng. Imad Hassoun	Deputy Minister / GEF national Focal Point.
Eng. Abir Zeno	Energy & Environment Team Leader / UNDP – Syria.
Eng. Haitham Nashawati	National Project Coordinator.
Dr. Yousef Meslmani	National Project Director.

Technical Committee of the Project:

Consisting of General Director of General Commission for Environmental Affairs, Energy & Environment Team Leader / UNDP - Syria, National Project Director, National Project Coordinator, and the representatives of: Ministry of State for Environmental Affairs, State Planning Commission, Ministry of Agriculture and Agrarian Reform, Ministry of Irrigation, Ministry of Industry, Ministry of Electricity/National Center of Energy Researches, Ministry of Housing and Construction, Ministry of Transportation, Ministry of petroleum and Mineral Resources, Meteorological Directorate, Universities, Scientific Researches Centers, and NGOs.

[This report has been approved unanimously by the technical committee, during the Technical Workshop which took place on 24/ 03/ 2009 in the Dedeman Hotel Palmyra.](#)

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Summary and Conclusions

- ✓ The study reviews the economic and social impacts of the climatic change in Syria, the prevalent economic activities in the main sectors and their contribution to the GDP. It indicates that the contribution of industry ranges between 22 and 26 %, agriculture between 21 and 25 %, while the retail and wholesale trade contributes by 17-21 %.
- ✓ The study shows the evolution of public and private investments share of the state budget. It indicates that the investments increased by 10-15 % of the state budget during the period 2000/ 2009. In terms of public and private banks funding, the first beneficiary was the commercial activities with 47 % of the total credits, followed by agriculture by 17.4 % and constructions by 15.6 %. Investments are also funded by credits and financial and technical assistance offered by Arab and foreign countries.
- ✓ Concerning the legislation related to the economic development, the Syrian economic has recently adopted the approach of the Social Market Economy. The main goal of this approach is to create a competitive economy that achieves the Syrian economic integration with the international economy and strikes a balance between economic performance and social equity.
- ✓ The study mentions the main financial, monetary, insurance, investment and trade legislation.
- ✓ The report analyzes the current demographic status and indicates that the population growth rate decreased to 24 per thousand and that population is distributed according to their residence between urban (53.5 %) and rural areas (46.5 %) of the total population that reached 22.3 million. 91.6 % of the total labor force is employed, while the unemployed account for 8.4 %.
- ✓ Employment distributes between the public sector (28 %), private sector (64 %) and cooperative and joint sector (8 %). This indicates the importance of the private sector in absorbing the labor force. The study also indicates that 60 % of the hired laborers get 9 000 SP and less and a part of them live under the poverty line.
- ✓ The study presents the current situation of poverty in Syria that accounts for 10.36 % of the population according to the minimum poverty line. It shows that poverty is higher in the rural area by 1.55-1.96 times compared to that of urban areas. Poverty is mainly concentrated in *Idleb, Aleppo, Al Raqqa, Deir Ezzor* and *Al Hassakeh*. There is a close relation between the nutritional level and poverty. 83% of the poor suffer from mal nutrition and have a calorie intake less than 2 200/ day, which is the internationally acceptable level.
- ✓ The study assesses the climatic conditions impact on the social and economic situation in various aspects namely: plant production, forests, steppes and sheep, water sector fragility, sea level increase, etc. It also indicates the financial and economic losses resulting from the unfavorable climatic conditions and the related impact on the national economy as well as the income of private and public production activities.
- ✓ Generally speaking, the adverse weather conditions, particularly the droughts, reduce plant and livestock production by 15- 60 % according to severity. Moreover, the cost of water increases by 15 % at least in normally dry years and 40 % in severely dry years. The increase of the sea level by 2-3 meters may result in the loss of the economic activities of around 2000 households, while 4000 households

will lose their houses and services. The damaged area is estimated at 6 000 ha, while the lost production is around 170 000 tons/ year. The value of the lost lands and infrastructure is estimated at SP 48 billion.

- ✓ In addition to the negative impact of climate on the social and economic situation in general, it will result in poverty increase, food security decline, migration increase and the instability of the living and health conditions.
- ✓ The report also highlights the main economic activities, groups, and regions that will be mostly affected by the climatic change. It indicates that agriculture and water sectors will be severely affected and that the communities of Albadia and the rain fed farming areas in the marginal and 3rd zone as well as the eastern region population will be affected by sand and dust storms. The coastal region population would be mostly affected by strong winds, thunder and rain storms and increase of sea level. These phenomena have economic impacts on green house holders, fruit trees and vegetable growers and fishermen, as well as social effects in terms of poverty increase, food security decline and instability of the living and health conditions.
- ✓ The study reviews the policies and actions taken to mitigate the social and economic impacts of the climatic changes in terms of desertification and land deterioration combating, water use rationalization, poverty reduction and food security improvement. These policies are mainly included in the development strategy for the period 2000- 2010 and in the annual plans of the development projects. It also points out the need to maintain the projects, actions and policies and evaluate them for better adaptation with the climatic changes.

Finally the study illustrates the ability and capacity of the Government and the local administrative units to deal with the climatic disasters by providing cereals and feed strategic stock and distributing food and financial aid to the communities of the vulnerable areas. Other actions include waiver from deferral interests and penalties and providing emergency assistance to mitigate the impact of water shortage as well as other government support to improve the food and water condition.

1. Current Status of the Prevalent Economic Activities in Syria

1.1. Contribution of the economy to the Syrian gross domestic product (GDP)

The Syrian GDP at the market price of 2007 (and the fixed price of 2000) is SP 1.39 billion (equivalent to US\$ 25.8 billion), while at the current prices it is SP 1.939 billion, equal to US\$ 48.4 billion. The contribution of the economic sectors to the Syrian GDP is indicated in the following table.

Table (1): The contribution of the economic sectors to the Syrian (GDP) during 2003/2007.

Sector	Average (003-2007)	Provisional figures of 2007
1. Agriculture	21-25%	21%
2. Industry and mining	22-26%	22%
3. Building and construction	3-4%	4%
4. Wholesale and retail trade	17-21%	21%
5. Transport and storage	11-14%	12%
6. Money, insurance and real estates	4-5%	5%
7. Social and personal services	2-3%	3%
8. Public services	11-13%	13%

Source: CBS

The table shows that industry and mining as well as agriculture come in the first place, followed by wholesale and retail trade and transport and storage sectors.

The review of the components of the production value of the main sectors indicates the following:

- **The industrial sector**

The value of the industrial production at current prices increased from SP 811 billion in 2004 to SP 1.447 billion in 2007 (equal to US\$ 16.9- 30.1 billion) at an annual increase rate of 21 %. The production is distributed as follows: 57 % for manufacturing industry and 35 % for extraction and mining industry and 8% for water and electricity. The value of the industrial production of 2007 is distributed between the public sector (73 %) mostly from extraction and the private sector (27 %), mostly from manufacturing industry.

- **The agricultural sector**

The value of agricultural production during the last five years (2003- 2007) at the fixed prices of 2000 ranged between SP 343 and 433 billion (US\$ 7.15-9.03 billion), while at the current prices, it ranged between SP 397 and 589 billion (US\$ 8.3-12.3 billion).

Plant production accounts for 60 % of the total production, while livestock production constitutes 40 %. The value of the agricultural production (at the fixed prices) that reached SP 433 billion was the best compared to the last five years, as 2006 had a favorable agricultural season, while in 2007 the value fell to SP 376 billion (15 %).

Further decrease (15% at least) of the agricultural production value is expected in 2008 due to the unfavorable weather conditions, particularly the precipitation decline and rain fall delay.

1.2. Evolution of the Syrian public and private investment

1.2.1. Public Finance of the State Budget

The Syrian Arab Republic state budget (both current and development) witnessed a considerable improvement. The overall budget increased from SP 275.4 billion (US\$ 5.74 billion) in 2000 to SP 588 billion (US\$ 12.25 billion) in 2007. The estimated budget of 2009 is SP 680 billion (US\$ 13.6 billion), shared by the current budget (60 %) and investment budget (40 %). The annual growth rate during that period ranged between 10 % and 15 %.

During the last years, there has been an increasing focus on increasing the development investment budget compared to the current budget. Accordingly, the investment budget accounted for 56-61 % of the overall budget during the period 2005- 2009. The annual state budget was shared by the following main activities:

- public services	36.7%
- national security	11.6%
- public safety and discipline	2.4%
- education services	9.8%
- health services	1.3%
- total insurance services	0.19%
- housing and utilities services	0.96%
- promotion, cultural and education services	0.44%
- fuel and energy services	0.11%
- agriculture and agricultural reclamation services	3.9%
- mining and minerals services	0.18%
- transport and communication services	0.34%
- other economic services	19.5%
- marginal reserves	12.58%

1.2.2. Funding by credits from public and private banks

Credits are offered by a set of **public banks** (the Syrian Commercial Bank, the Industrial Bank, the Agricultural Cooperative Bank, the Real Estate Bank, the Popular Credit Bank and the Saving Bank). They are also offered by the **private banks** (*Bimo*, Syria and Overseas, International and Arab Bank, *Audi*, *Biblus*, Syria and the Gulf, the International Islamic Bank).

In 2007, the total number of the banks and branches operating in Syria was as follows:

Public	275
Private	66
Foreign banks in the free zone	7

Total	348 banks

The total credits offered by these banks reached SP 633 billion (US\$ 13.2 billion) shared by public banks (89%) and private banks (11 %).

The distribution of these credits by the economic activities is as follows:

- Agriculture	17.4%
- Industry	4%
- Real estate construction	15.6%
- Trade	47.7%
- Other services	15.3%

Trade takes the leading position in terms of credits, followed by agriculture, then industry. On the other hand, interest rates vary according to the loan type, term, activity and beneficiary (public, private or joint sector).

It is worth mentioning that the interest rates applied on medium incomes and crucial activities such as housing and other production and minor service activities.

1.2.3. Credit by investment promotion

In the beginning of the 90s, the government realized the importance of creating a proper investment environment in Syria. Actions were taken for issuing the required legislation, diversifying investment incentives and guarantees, enhancing the participation of the private sector to the development process and investments funding, and insuring labor market flexibility. Law no. 10 of 1991 and its modifications attracted Syrian expatriates as well as Arab and foreign investors, particularly after the issuance of Decree no. 8 of 2007 that offered more facilities and concessions to ensure investment funding in general and attract Arab and foreign investments in particular.

The investments licensed under the above mentioned legislation during the period 1991- 2006 reached 3 824 with a value of SP 1.3 billion (US\$ 3 million). These investments created 220 000 jobs. It is worth mentioning that the agricultural and food processing investments account for 17 % of the total licensed investments and that the agricultural investment witnessed an increase during the year 2006 as it doubled in comparison with the total of the reference period, which indicates that investment funding is focusing on agriculture.

Legislative Decree number 9 was passed in 2007 to establish the General Investment Commission entrusted with the implementation of the national investment policies. The Decree also provided for the establishment of the single shop to provide investors services as well as the establishment of the Supreme Investment Council. In this context, the government has been facilitating and simplifying the licensing procedures and developing the related infrastructure and information provision and dissemination.

1.2.4. Funding in the form of credits and financial and technical support from the credit banks and the Arab and international banks

With the aim of optimal utilization of the natural resources and increasing the economic activities, the government, in collaboration with Arab and international credit funds, has implemented a number of development projects that improved the food security situation both in Syria and in the whole region. These projects also reduced unemployment and secured a consistent source of income and reasonable living standard. Due to the lack on information and data related to this type of credits during the last ten years, the study focused on the agricultural sector that will be greatly influence by the climatic conditions. It is worth indicating in this respect, that during the last ten years, the agricultural sector

has been benefiting from the funding offered by the Ministry of Agriculture and Agrarian Reform amounting to US\$ 415 million.

1.3. The main legislation related to the development of the Syrian Economy

The economic reform process adopted by the Syrian government was accelerated considerably during the last few years, thanks to the adoption of the Social Market Economy approach that aims at: (i) creating a competitive economy, (ii) enhancing integration with the international economy, and (iii) ensuring social equity. As a result of these reforms, the Syrian economic policies started to comply with the rapid changes. The private sector was enhanced and the legislative and regulatory environment was improved so as to push forward the economic development process, ensure the growth of the GDP, reduce unemployment rate, develop exports and investments, increase productivity and modernize the financial system and infrastructure. Several laws and regulations covering the finance, monetary, taxation and banking systems were passed to organize the transition to the Social Market Economy system. The regulations also aimed at improving the investment environment, liberalize foreign trade, simplify trade procedures, relax currency regulations and carry out institutional development and administrative reforms.

The following section presents the main economic legislation

1.3.1. The finance aspects

A report recently published by the International Economic Forum, appreciated the significant improvement witnessed by the Syrian economy during the last decade. During the last period, budget deficit decreased, the inflation rates declined, the exchange rate was stable, and the monetary liquidity was available.

The Government is giving due attention to the enhancement of the banking structural reform and enforcement of the banking system in order to increase its competitiveness against the international banks that enjoy favorable conditions due to the financial services liberalization. Moreover, the government is promoting the flexibility of the private banks in the area of funding the private sector activities. To this effect, regulations governing the banking activities and dealing with foreign currency were passed to enable these banks to meet the development process needs (Law no. 28 of 2001).

The total number of licensed banks is 10 in addition to 3 Islamic banks. This step aims at enhancing the participation of the private sector in the money cycle and expanding the range of the banking services in order to increase their attractiveness of foreign investments and trade funding.

The legal reforms included: (i) the restructuring of the Central Bank and the expansion of its activities, (ii) giving the independence status to the Commercial Bank and (iii) opening the space for new banking and financial activities. The reforms targeted increasing the total deposits at these banks. Accordingly, the Central Bank increased the interest rates applied on deposits in order to increase the saving and, consequently, investments. Moreover, the interests applied on the saving deposits less than SP 1 million were reduced to 4 % instead of 5%, while those applied on deposits kept for more than one year were increased to 7 %. The investment certificates' interest was raised to 7.5 % instead of 6% and 6.5 %.

Law (no. 24) was passed in 2006 to allow the Monetary and Credit Council to license the establishment of exchange companies, while Decree no. 15 of 2007 allowed the Council to establish social financial-banking companies with the aim of providing micro credits to certain beneficiaries.

1.3.2. Monetary aspects and exchange rate

The 10th 5 years plan reflected the government intention to develop the monetary sector and facilitate dealing with foreign currency. In this respect, Syria achieved a considerable success in stabilizing the exchange rate by securing a sufficient foreign currency surplus. The multiple exchange rates were reduced to two, namely:

- The government and public sector transactions rate that matches with the actual market rate resulting from demand and supply. It is applied on the earnings of public companies' imports and exports, as well as the state budget and taxes revenues and expenditures.
- The free exchange rate determined by the Central Bank according to the demand and supply and the real value of the Syrian Pound in the financial markets. This marks a significant improvement, thanks to the Prime Minister's Decision (no. 5.787) of 20/ 12/ 2006.

In the context of the monetary reforms implemented by Syria, there is an orientation to give the Central Bank more independence in designing and implementing its financial policies. Moreover, there has been a decoupling between the value of the Syrian Pound and the US Dollar that was replaced by the currency basket in order to protect the foreign currency reserve from the exchange rate fluctuations and to achieve the maximum stability for the Syrian Pound. In 2005 half of the Syrian reserve was converted from US Dollar to Euro. Decision no. 366 of 12/ 06/ 2006 provided for the use of the Euro instead of the US\$ in the future import and export contracts as well as the public sector services.

1.3.3. Insurance aspects

The government is aiming at increasing the contribution of the insurance sector to the GDP (currently 0.35 %) to 1 % by 2010. During the last two years, private insurance companies have been established under Legislative Decree (no. 43 of 2005) that allowed the establishment of such companies. The government is promoting the use of rapid investments insurance, which resulted in an increase of the private insurance companies operating in Syria to 8.

Legislative Decree no. 46 of 2007 considers the Syrian Public Insurance Company as an economic company that enjoys a corporal body and financial and administrative independence. The company is located in Homs and reports directly to the Minister of Finance.

1.3.4. Investment aspects

Syria has covered major strides in developing its financial sector. The state budget deficit did not exceed 5 % of the GDP including the oil earnings. These conditions contributed to the stability of the Syrian economy and provided the financial resources needed for private investments and, consequently, the enhancement of the economic growth.

Moreover, the efforts exerted by the government to reduce the external debt were fruitful, as agreements have been concluded to reschedule these debts.

The budget reforms included the issuance of Legislative Decree (no. 54 of 2006) related to the modernization and organization of the current and investment public expenditure.

Concerning the taxation policy, a lot of modernization initiatives have been made to facilitate local and foreign investments. The main objective of this endeavor was to improve the taxation structure, simplify the related rules, eliminate the tax collection complexity, expand the tax payers' category, and combat tax evasion. The income tax was reduced from 63 % to 35 %, while the ceiling of the income exempted from income tax

was raised from SP 1200 to 5000. Despite the reduction of the tax rates, the tax revenues increased by 18.7 % compared to 2005.

For more attraction of private investments, Law no. 10 of 1991 was replaced by Decree no. (no. 8 of 2007), included more concessions and incentives compared to those offered under Law (no. 10).

Among the other advantages included in the Decree was the establishment of the single stop to facilitate the licensing process. The Investment Commission was established under Decree (no. 9 of 2007) to prioritize the licensing applications according to the sustainable development requirements and to select the investments that best meet the social and economic development objectives.

Furthermore, Legislative Decree (no. 29) was issued in 2008 to establish the Agricultural Subsidy Fund at the Ministry of Agriculture and Agrarian Reform. The Fund will have subsidiary branches all over the Syrian governorates and will be entrusted with subsidizing the agricultural inputs and the prices of some crops. Also the Department of Agricultural Production Subsidy and its branches were established and an amount of SP 10 billion was allocated under the investment plan of 2009 to make the Fund operational.

1.3.5 Trade aspects

The trade liberalization efforts and the trade agreements concluded with some countries constitute a part of Syria's endeavor to open its economy and enhance its competitiveness. Trade agreements have been concluded with countries like China, India, Democratic Europe, Russian Federation, and other African and South American countries with the aim of benefiting from some preferential concessions, facilitate trade flow and enhance investments. In this respect, the Great Arab Free Trade Area was implemented by most of the Arab countries (17 countries). According to the agreement, Syrian goods flowing into these countries enjoy an exemption from custom tariffs, fees and taxes with similar effect. Moreover, a Free Trade Agreement has been concluded with Turkey, according to which some tariff-free quotas have been given to some Syrian commodities that can be increased in the future.

Additionally, at the end of 2008, the Syrian-EU Association Agreement has been initialized in preparation for its entry into force. Also, the accession of Syria to WTO will create more trade concessions as it will facilitate the Syrian integration with the international trade regime. Legislation related to the establishment of the Syrian Export Promotion Fund and the Syrian Export Promotion Commission is under consideration.

2. Analysis of the current situation of the Syrian demography, manpower, poverty and unemployment rates

2.1. Population and demographic indicators

The most recent Central Bureau of Statistics (CBS) data on the civil registry published in January 1st 2008 indicate that the total number of the Syrian population is 22.3 million, with males accounting for 50.2 % and females for 49.8 %. The number of Syrians actually living in Syria on the mentioned date was 19.4 million accounting for 87 % of the total, out of which 51.1 % were males and 48.9 females.

On the other hand, and according to the results of the population censuses of 1981, 1994 and 2004 and the estimations of the CBS related to the annual population

growth rate during the two periods (1995-2000) and (2000- 2005), the average growth rate of the Syrian population was as follows:

Table (2): the average growth rate of the Syrian population during 1981/2005 - Source: CBS

Period	Annual growth rate per thousand
1981-1994	33.0
1995-2000	27.0
2000-2005	24.0

The table shows that the Syrian population growth rate is higher than the international rate, though it declined significantly during the last years.

Aleppo, Damascus and Rural Damascus are the most populated Syrian governorates as Aleppo has 22.8 % of the total, while Damascus and Rural Damascus for 15.2 %. On the other hand, Qunaitera and Sweida have the lowest population density as they have 2.0 % and 2.1 % respectively. The population density is 96 persons/ km². Damascus has the highest density (around 13.152 people) followed by Lattakia (383) and Tartous (376), while in *Deir Ezzor* it didn't exceed 30 persons/ km².

The Syrian population is distributed between urban areas (53.5 %) and rural areas (46.5 %). The following table shows the distribution according to the governorates:

Table (3): the distribution according to the governorates in Syria- Source: CBS

Governorate	% Rural	Governorate	% Urban
<i>Rural Damascus</i>	48.5	<i>Deir Ezzor</i>	55.4
<i>Aleppo</i>	37.6	<i>Idleb</i>	74.4
<i>Homs</i>	45.8	<i>Al Hassakeh</i>	64.0
<i>Hama</i>	63.1	<i>Al Raqqa</i>	61.0
<i>Lattakia</i>	48.6	<i>Sweida</i>	68.0
<i>Tartous</i>	71	<i>Daraa</i>	55.2
<i>Qunaitera</i>	100		

Half of the population of Damascus, Rural Damascus, Aleppo, Homs and Lattakia live in the rural regions (45-48 %) while in the other governorates, this percentage ranges between 55-71 %. This emphasizes the importance of the rural development.

• **Manpower, labor force and unemployment rates**

The labor force represents all the males and females above 15 years and who are economically active (can work). It also includes those who work directly or indirectly in the commodities production or in the provision of services. Furthermore, the labor force is composed of the actually employed and the unemployed people.

According the CBS survey of 2007, the total labor force in Syria was 5.400 million accounting for 24 % of the total population. Males represented 84 %, while females accounted for 16 %, which indicates the male concentration of the Syrian labor force.

Labor force distribution according to age categories:

- 20-24 years 16% of the total labor force

- 25-29 years 15.5%
- 30-34 years 13%
- 35-39 years 12.3%

These age categories compose 56.8 % of the total labor force.

In 2007, the total employed labor force was 4.946 million accounting for 91.6 % of the total, i.e. the unemployed labor force accounts for 8.4 % of the total force (4.7 % are elementary school graduates and less, 47 % intermediate education, and 6 % hold university degrees and above).

Distribution according to sectors is as follows: 28 % in the public sector, 64 % in the private sector, and 8 % in the cooperative and joint sectors, which indicates the importance of the private sector in absorbing the labor force.

The distribution of labors based on the education level shows that most of them (59 %) have elementary education or less, while university graduates account for only 7.7 %. On the other hand, the labor distribution according to the type of employment is as follows:

Table (4): the labor distribution according to the type of employment- Source: CBS

Employer	8.5% of the total mainly traders, industrialists, and agricultural investors
Self employed	28.9% of the total, mainly professionals, handicrafts men, and small investors
Hired	53.7% mostly working in industrial and commercial enterprises and farms
Family unpaid labor	8.7% mostly working in agriculture or family trade and industrial activities
Unpaid labor working for others	2.3% working for charities and NGOs

The table indicates that most of the labors are paid laborers followed by the self employed, mostly working in professions and handicrafts in the private sector. *The distribution according to the type of activity is as follows:*

- Agriculture 19.1% of the total employed labor
- Industry 14.2%
- Building and construction 14.9%
- Trade, hotels and restaurants 15.8%
- Transport and transportation 7.1%
- Finance, insurance and real estates 2.7%
- Services 29.1%

Most of the employed laborers work in the services sector with the public sector absorbing 22% followed by agriculture, trade, hotels and restaurants which are all private. As for the income level, the statistics of the CBS indicate that *the paid laborers are distributed according to the wage category as follows:*

Table (5): the labor distribution according to wage category - Source: CBS

Wage category (SP/ year)	% of the total paid laborers
5000 and less = US\$ 104 and less	13.6%
5001-7000=US\$ 105-146	22.5%
7001-9000=US\$ 147-189	24.7%
9001 and more=US\$ 189 and more	40%

Around 60 % of the laborers whose salaries range between < 5000- 9000 SP/ month = <US\$ 104- 188, laborer wage rate is less than US\$ 3-6/ day/ person.

The wage of most of these categories (less than 9.000 SP/ month) is under the poverty line (if we consider that most of these laborers afford their families and that the average family size is 6 members).

- **The current status of poverty level in Syria**

The sustainable growth rates contribute to the alleviation of poverty by generating employment, increasing production and productivity, and improving the real wage levels. The only study on poverty was conducted in collaboration between the State Planning Commission and the UNDP in February 2005. It provided an analytical vision of the current situation of poverty and compared two periods (1996/ 1997) and (2003/ 2004) with the aim of designing a poverty combating strategy. The study offers a right understanding of the nature and dynamics of poverty based on the income and expenditure in the beginning of the 21st century. It mainly aims at evaluating the past and future policies to alleviate poverty by adopting the right programmes to be conducted in various sectors.

The following section presents the main outcomes of the study and supports it with recent information published by the CBS in 2007 in order to better present the current situation of poverty in Syria and the related factors.

- ✓ The study indicated that the total number of the Syrians who can not afford for their food and non-food basic needs was around 2.02 million (11.4 % of the total population) in 2003/ 2004. The application of the international comparison tool that estimates the poverty line according to the individual income (US\$ 2/ day) shows that the poverty rate in Syria is 10.36 % (the lower poverty line)¹.
- ✓ It is noticed that the Syrian poverty rate is relatively low, compared to the international standards (*Adams, 2000*) and the other Arab countries. For instance in Jordan it is 7.5%, Tunisia 19.9%, Iran 16.4% and in Algeria it is 30.5%.
- ✓ Moreover, the poverty study classified the Syrian poverty and un-deep poverty when compared to the poverty gap (p1) and poverty extremity (p2) rating 2.135 and 0.62 % respectively. These two rates are low compared to medium-income countries.

¹ . **The nutritional poverty line** or the extreme poverty line is the one that reflects the monthly individual expenditure on the food basket to get the minimum needed daily intake of energy and calories according to the WHO criteria.

The higher poverty line is the real consumption expenditure of the poor on food and non-food commodities. It is the result of expenditure on the nutritional poverty line added to the non-food expenditure of the households whose nutritional expenditure equals the value of the nutritional poverty line.

The lower poverty line is the one that reflects the household expenditure on the food and non-food commodities that meet its basic needs. It is the result of expenditure on poverty line added to non-food expenditure of the households whose annual expenditure equals the value of the nutritional poverty line.

- ✓ The comparison of poverty rates in the rural areas to those of urban areas indicates that rural poverty is higher than urban poverty by 1.55- 1.96 times. While the comparison of poverty rates on the region level indicates that it is higher in the North-Eastern part of the country (*Idleb, Aleppo, Raqqa, Deir Ezzor and Hassakeh*).
- ✓ The poverty rate in these regions reached 17.9 % followed by the urban areas of the same regions (11.2 %). The southern urban regions (Damascus, Rural Damascus, Daraa Sweida, and Qunaitera) have the lowest rate (5.8 %) which indicates that poverty is severe in the rural areas, particularly in the north and eastern governorates. While in the central regions, poverty and inequity rates are lower than those of the northern and eastern governorates and higher than those of the southern governorates, ranging between 9.02 % in urban areas and 11.10 in rural areas.
- ✓ On the other hand, the comparison of the poverty scale on the national level indicates a decline of poverty rate from 14.4 % during the period 1996/1997 to 11.35 % during 2003/ 2004. Moreover the p1 and p2 witnessed a decline, which refers to an improvement in the inequity of expenditure.
- ✓ Concerning the relationship between poverty and the educational level, the study showed that 81 % of the poor have elementary education and lower, while those who have university degree account for 1 % of the total poor only. It seems that there is a negative correlation between poverty and education.
- ✓ Referring to unemployment rate and its relation with poverty, the unemployment rate declined from 13.4 % during 1996/ 1997 to 8.6 % during 2003/ 2004. Unemployment rate during the second period was 12 % of the total urban and rural poor, while for the better off category it reached 7.4 % in urban areas and 9 % in rural areas. It is worth mentioning, however, that in 2007 the unemployment rate was 4.8 % indicating a strong correlation between unemployment and poverty on the national level.

As for the distribution of the poor segment according to the employing sector, 14% of those belonging to poor households work for the public sector, while those working in the informal and private sector account for 48 % in rural areas and 31 % in urban areas.

Generally speaking, it seems that public employment is not very effective in poverty reduction or combating.

- ✓ On the level of economic activity during the period 2003/ 2004, industry and environment sectors absorbed the major part of the poor laborers as 50 % of the poor are employed by urban employers. On the other hand, 56 % of the rural poor work in agriculture. These facts indicate the need for a poverty alleviation policy in urban areas, particularly the sectors of industry and construction; and rural areas, particularly agriculture.
- ✓ There is a close relation between poverty and the family size, as the rate of poor families with 4- 6 members is 5.1 %, while that of families with 7- 9 members is 23.5%. It is worth mentioning also that the family size decreased from 6.74 members in 1997 to 5.82 to 2004, which contributed to poverty alleviation in the second period. Furthermore, the family size declined to 5.5 members in 2007.

It is worth underlining that there is a close relation between the Syrian individual nutritional level and the poverty severity, as 83 % of the poor (according to the Food Security Committee of FAO) suffer from malnutrition and are unable to obtain the required calorie (2200 calories/ day). This situation negatively influences the health

and activity of the poor. The per capita intake of calorie during the last five years, ranged between 2800 and 3200 calorie/day which is acceptable compared to that of many countries.

- ✓ The CBS data of 2007 and their comparison with 2004 give an approximate estimation of the current situation of poverty in 2007.
- ✓ **Unemployment rate:** unemployment stabilized between 2004 and 2007 with a range of 8.6- 8.4 %.
- ✓ **Hired laborers** who get more than 9.001 SP increased from 11 % in 2004 to 40 % in 2007 of the total hired laborers, which indicates a relative increase of the income level of a big category.
- ✓ **On the other hand** the food and non-food commodities prices increased by 25- 45 % between 2004 and 2007 (Ministry of Agriculture and Agrarian Reform, Department of Agricultural Marketing). This is due to the international oil price inflation on one hand and the weather conditions on the other, particularly between 2007 and 2008.

The personal estimations indicates that the salaries' increase during the mentioned period that was mainly focused on public employees, does not match with the commodities and services price increase. This stresses the fact that, in best assumptions, poverty is still as it was during the last period 2003/ 2004.

3. Measurement of the Impact and Sensitivity of Climate Change on the Economic and Social Conditions

It is difficult to define the negative impact of climate change on the economic and social conditions as this requires field surveys, detailed studies, and experiments as well as frequent on the spot monitoring. Accordingly, we will use the technical and production indicators of the project studies as well as the output of the research conducted by other governmental, Arab and international projects to assess the negative impacts of the adverse weather conditions on the economic and social levels. It is worth mentioning to this respect that these estimations are related to the direct impacts; while the indirect impacts assessment require specialized studies and more time and effort.

The project studies included a set of technical and production results concerning to the impacts of the climate change in Syria on the agricultural sector (impact on plant production and productivity of wheat, barley and olives), the grazing sector (including livestock production), the forest sector, water sector, increase of sea level, desertification, energy and the health sector.

The following section will review the main economic and social impacts of the climate changes.

3.1. Impact of climate change on the economic and social aspects in the area of plant production

According to a study conducted within the project on "Assessment of the Climate Change Impact on the Syrian Agricultural Sector", the average annual temperature increase will be 3.5 degrees, while the annual rain fall will decline by 12 % compared to the average. This will result in a decline in the irrigated and rain fed wheat production by 10 % and 14 % per year respectively, while cotton and olives production will fall by 5 %.

According to these estimations, the calculation of the loss value of the decline of wheat production by 12 %; industrial crops by 10 % and fruit, vegetable and other crops by 5 %, the value of plant production will fall from SP 330 billion to SP 306 billion, with a percentage of 7.8 %. This, in turn, will lead to adverse effects on meeting the local needs on food as well as on the export earnings, particularly the exports of cotton and olive oil.

A study conducted by the National Programme for Drought Combating in 2001 (Ministry of Environment and the UNDP, SYP/ 98/ 005) on the economic impact of land deterioration and desertification (*Jabbour, Khazma and Abdul Aziz*) refers to the decline of wheat and barley production in 1998/ 1999 due to the severe drought. It indicates that rain fed wheat fell by 38 %, while barley production fell by 50 % compared to the average of the previous five years. This fall resulted in the loss of 1.4 million tons of wheat and 426.000 tons of barely, costing 21.6 billion Syrian Pounds according to the current prices.

A study conducted by an FAO mission (The Economic Impact of Land Deterioration and Desertification by *Dr. Jabbour, Khazma and Abdul Aziz*) indicated a shortfall of residues of cereals (wheat, barley, lentils and chickpeas) used as feed during the drought season. This is due to the decline of the residues production from 4.8 tons/ ha in normal years to around 1.7 ton/ ha in dry years (64 %). The value of the feed deficit was around SP 10 billion at current prices.

The data of the Ministry of Agriculture (Plant Production Department) show that the green houses of Tartous were subject to strong wind on 4/ 3/ 2007 resulting in the damage of 90% of around 235 green houses. The value of this damage was estimated at Sp 37 million. The lost tomato crop was 529 tons, while cucumber loss was 338. The number of affected holders was 70 households.

Moreover, the Ministry of Agriculture data reveal that, during the period 10-21/ 1/ 2008, the Syrian governorates had very low temperature compared to the normal average, resulting in bad consequences on protected crops, citrus and olive trees, as well as field and winter vegetables and crops. The estimated value of the damage is SP 213 million.

On the other hand, the CBS and MAAR data show that during 2006 (a reasonable agriculture year) and 2007 (a dry year) the value of plant production at the fixed prices of 2000 decreased from SP 249 billion in 2006 to SP 225 billion in 2007 at an annual rate of 10.7 %.

In addition to the national economy and balance of payment losses, droughts reduce the farmers' income and the staples supply, leading to price increase and adverse effects on the food security condition. These effects lead, in turn, to negative influence on public health, social and economic activity (decline of per capita share of energy and protein during the reference period by 15-20 % according to the Agricultural Economics Department).

3.2. Impact of climate change on the economic and social aspects in the area of forestry

The project study concerning the sensitivity of the Syrian forest sector to climatic conditions conducted based on the CAB study of 2005, showed that the total value of the forest economic and environmental contribution is SP 43 billion Euros. The role played by forests in the protection of water falls (estimated at Euro 42.5 million) is one of the main benefits of the Syrian forests.

The financial values mentioned above are exaggerated compared to the contribution of the Syrian forests to the Syrian economy that does not exceed 0.1 % of the total national income, due to the negligence of the environmental role of these forests.

The review of the land use shows that the forest area decreased from 601.000 ha in 2006 to 576.000 in 2007 (by 25.000 ha) with a fallback of the forest cover due to the relative drought of 2007.

By calculating that around 50 % of the deterioration (12.5 thousand ha) resulted from the climatic conditions, and that the fallback of the annual coverage is not less than 10 % of the forest area, the total deteriorated area reached 30.000 ha due to the coverage decline. Taking into account that the average productivity is 2 m³/ ha per year and that the price per cubic meter is 3.000 SP, the total annual loss of raw timber is: 73.000 ha X 2 cubic meters of timber X 3.000 SP = 438 million SP

This is equal around 2 % of the total agricultural production value of 2007.

This value will be far exceeded if the environmental significant impact of this deterioration is taken into account.

3.3. Impact of climate change on the economic and social aspects in the area of livestock production (sheep and pastures)

The project study “Drought Impact Estimation on Pastures and Livestock Production Sector” shows the main losses incurred due to the drought waves that hit Syria and the region in 1998/ 1999. Moreover, the studies of MAAR, Department of Al Badia, Steppes and Sheep define the main negative influences on sheep productivity in the Syrian Badia during that period. The indicators included in that study have been used to assess the economic and social impacts of the drought, namely:

- Increase of new born sheep mortality rate from 5 % to 35 %.
- Increase of mature sheep mortality rate from 2 % to 12 %.
- Decline of sheep milk from 60 to 15 kg / head.
- Decline of wool production from 2.5 to 1.5 kg/ head .
- Increase of feed consumption due to the pastures deterioration by 150 feed units/ year.

The loss incurred is estimated at SP 38.6 million at the prices of 1999 equivalent to Sp 95 million at the prices of 2007.

In addition to the decreased weight and fertility and to decline in prices, the economic and social situation got worse due to the continuation of the drought in 1999/ 2000. The Bedouins were always concerned about their herds due to frequent movements, the increasing feed and water demand, and the proliferating pressure on steppes and water

sources. More than 70 % of those who own less than 150 head lost their herds and had to migrate to urban centers seeking employment and jobs, mainly in the construction sector. Members of some other families had to work in agriculture and other services as drivers or guards.

On the other hand, and according to the CBS and MAAR data, the value of livestock production (at the fixed prices of 2000) fell from SP 161 billion in 2006 (a reasonable season) to SP 151 billion in 2007 (a relatively dry season), registering a decline rate of 7 %. This amount represents the direct loss of livestock production, while the indirect losses related to the herd deterioration, the price increase combined with the unavailability of livestock products, and the deterioration of food security is estimated at 8 % of the food budget (MAAR estimates).

As for natural steppes, particularly the Syrian Badia, which is the most sensitive area for climate change (annual rainfall does not exceed 150 mm), the project study estimated the loss by 180 feed unit/ha. Almost, the same figures were estimated by the FAO mission for the assessment of the drought effect in 1999 “Economic Impacts of Land Deterioration and Desertification” (*Jabbour, Khazma and Abdul Aziz, 1999*).

The availability of fodder during the mentioned season was (0) compared to 165 kg of dry fodder (equal to 94 kg/ha of barley in normal years). Accordingly, the total feed loss is estimated at 1000-800 thousand tons valuing SP 10 billion.

Al Badia, Steppes and Sheep Department estimated that 40 % of the planted grazing shrubs (equal to 46 million seedlings) dried out, and 24 million shrubs were also lost.

The total area of lost pastures is estimated at 164.000 ha containing 70 000 shrubs with a value of SP 2 billion, not to mention the environmental adverse impact, particularly the increasing desertification.

3.4. Impact of climate change on the economic and social aspects of water sector fragility

The project study related to the “Fragility of the Water Sector Due to the Climatic Changes” indicated a decline in all water sources in Syria. It estimated that the runoff of the Euphrates and Tigris decreased by 20-30%. Moreover, the ground water tables decline reached 20 meters during the last 10 years. The use of the available water sources resulted in a deficit of 4 000 million m³/ year in 2002. This deficit decreased to 2 000 million m³/ year in 2003 due to the agricultural policy that promoted water use rationalization by conversion to modern irrigation systems.

Generally speaking, the study estimated that agriculture consumes 88 % of the available water, while 3 % goes for industry and 8% for drinking and services.

The per capita share of drinking and services water is not more than 1 000 m³/ year, which is close to the poverty line, let alone the quality of that water.

The economic and social effects of water use will be measured focusing on the agricultural sector due to its importance as a main consumer of water. These effects can be summarized as follows:

- 1. The social and economic impact of the use of modern irrigation systems:** Due to the importance of water use, particularly ground water, and the need to accelerate conversion to modern irrigation, Decree no. 91 was issued on 29/ 9/ 2005. It mainly provided for the establishment of the Conversion to Modern Irrigation National

Fund, aiming at converting 1.2 million ha representing the irrigated area to modern irrigation during a period of 10 years. An amount of SP 73 billion (US\$ 1.5 billion) was allocated for this purpose, out of which SP 20.9 billion was allocated to rehabilitate the public schemes, while 52.2 billion will be given as soft loans to farmers and producers willing to install modern irrigation networks.

According to the estimates of MAAR, these technologies will reduce water use by 50% and increase yield by 25- 35 %.

According to the above mentioned indicators, the assessment of the cost of production of wheat, cotton and apples will decrease as follows if the modern irrigation technologies are used:

- Cotton average cost of production will decrease from 46.5 SP/ kg if irrigated by traditional methods to 29.1 SP/ kg if drip irrigation is applied.
- Irrigated wheat cost of production will decrease from 15.3 SP/ kg to 10.6 SP/ kg if irrigated by sprinklers.
- Irrigated apples cost of production will decrease from 21.1 SP/ kg to 14.3 SP/ kg if irrigated by sprinklers.

The project achieved its objectives over the last two years, as the area irrigated by modern technology increased from 10 % to 18 % of the total Syrian irrigated area.

By applying these results to the crop and fruit trees cultivated area, it is possible to estimate the total saving as follows:

Table (6): the total annual economic saving regarding agriculture
Source: Ministry of Agriculture's estimations, Syria

Crop area	Difference in the cost of production / ha	Total saving
1389 thousand ha	17 thousand SP	23 billion SP
Area of irrigated fruit trees	Difference in the cost of production / ha	Total saving
994 thousand ha	31 thousand SP	31 billion SP

By applying the results on the crop-cultivated area and the irrigated area under fruit trees, it becomes possible to estimate the total annual saving on the Syrian agriculture level.

The total economic saving will be SP 54 billion per year, which is equal to the costs allocated for the development of the irrigation technologies during the ten years. Additionally, there will be a production increase of 30 % of the current production with the value of SP 100 billion at the current process. This will, in turn, result in farmer income increase, living standards improvement, local demand meeting, food security and price stability, in addition to the improvement of the soil fertility. Traditional irrigation resulted in the exit of 70.000 ha from production (*Jabbour, Khazma and Abdul Aziz*) due to the salinization. Moreover, the resulting direct annual loss is estimated at SP 10 billion/year.

- 2. The social and economic impact of ground water table decrease:** The project study on water sector fragility indicated that during the last ten years and due to the frequent draughts and over pumping of ground water, the water table decreased by

20 meters. Moreover, the project study "Mathematical Modeling" indicated that the drought of 2001 and the subsequent droughts during the following three years resulted in ground water table decrease by 5 meters.

Using these data, it is possible to estimate the direct economic impact of the pumping cost increase and the additional costs related to deepening the wells and providing the required accessories.

In 2007, the total number of well was 213.000 at various depths. These wells are classified as follows:

- Deep wells of 150 meters and above,
- Medium wells of 100- 150 meters, and
- Surface wells of depths less than 100 meters.

The field data show that a decrease of 20 meters in the water table increase the cost of wells deepening as the cost of digging is 1.500 SP/ meter, while the accessories cost is 500 SP/meter. The cost of deepening the wells by 20 meters can be calculated as follows: **20 m × 2.000 SP/ m × 213.000 wells = SP 8.5 billion**

The additional cost of increasing the pumping by 20 meters will increase from 9.1 SP/m³ (standard depth of 213 meters) to 10.10 SP (depth of 233 m). Accordingly, the cost of an average water ration of irrigated land (crops + vegetables + fruit trees) estimated at 6 200 m³/year/ha will increase from 56 240 SP/ha to 65 620 SP/ha.

The total cost resulting from wells deepening by 20 meters, considering that the total area irrigated from wells in 2007 is around 812.921 ha, is calculated as follows: **812.921 ha. × cost increase 6.240 SP = SP 5.073 billion.**

Additionally, there will be indirect effects of water depletion, the increase of time and effort needed to get the same water ration that my increase the cost by 15 % at least.

- 3. The social and economic impact of rain fall decline by 20%:** The decline of rain fall will increase the cost of irrigated farming. The project study shows that the rain fall decrease by 20 % will increase the number of irrigations and the water needed by 1.5 irrigations/year. The cost of this increase will be 6.800 SP/ha and the total cost of irrigation from wells (813.000 ha) will reach SP 5.5 billion.

The Mathematical Modeling study stated a projected rain fall decrease in the middle of the current century by 40.50 mm in the upper Euphrates and Tigris basin (7 % of the average precipitation) resulting in a decline of the Euphrates and Tigris runoff by 11 %.

According to these data, the production will fall by 11 % at least, leading to a loss of production by 1.5/ ha/ year for the river-irrigated land (181.000 ha). The total incurred loss is estimated at 1 million tons with a value of **SP 20 million.**

- 4. The social and economic impacts of sea level increase:** The project study conducted on the impact of sea level increase on the Syrian coast estimated the related risks during the period 2000- 2100 under five scenarios starting from 1 meter up to 5 meters. The scenarios indicated the covered areas based on the current land use map. In order to assess the social and economic impacts of this climatic phenomenon, the following considerations were adopted:

- Taking the average probability of the land covered if the sea level increases by 3 meters.
- Estimating the losses of the cultivated covered land using the cost of production applied by MAAR.
- Estimating the losses resulting from land investment and the value of covered lands based on Legislative Decree no. 437 of 3/ 10/ 2000, after updating the economic indicators according to the current prices of 2009 published by MAAR and the CBS.
- Reviewing the current price of lands and infrastructure in the area parallel to the coast.

The attached table indicates the financial and economic results of the sea level increase by 2.5-3 meters (average of the probabilities) The results can be summarized as follows:

The increase of the sea level resulting in covering an area of 4 108 ha of land under fruit trees (citrus and olives), forests, crops and field and protected vegetables.

The loss of 450 ha of sandy land and 1 090 ha of populated urban land.

The total financial loss resulting from the loss of cultivated land, including the establishment cost of fruit trees and infrastructure, is estimated at SP 50 billion if the increase ranges between 2.5- 3 meters. The loss goes down to SP 10 billion with the scenario of 0.6 meters increase and SP 84 billion with the scenario of 5 meters.

The total loss of fruit and vegetables is estimated 170 000 tons/ year.

Around 2 000 households will lose their economic activity (considering that the average holding size is 20 dunnums) and around 4 000 households will lose their economic activity in general, their residence and their services. This will lead to an increase of internal migration and the related social and living standards instability.

In addition to these direct effects there will be the indirect effects related to the sea impact on other new uncovered land, such as ground water salination, other climatic and environmental effects resulting from sea water salinity on agricultural production, particularly the loss of lands convenient for tourist and commercial investments.

Table (7): Losses resulting from the increase of sea level in the coastal area according to the average estimation of the sea level increase by 2.5-3 meters

Activity	Damaged area (ha)	Losses resulting from land loss						Establishment losses		Total losses (million SP)
		Yield (ton/ha)	Lost production (ton/year)	Investment period (year)	Unit cost (000 SP)	Losses per ha (000 SP)	Total annual loss million SP/year	Per ha (000 SP)	Of the total area (million SP)	
Citrus farms	1390	30	41700	20	15	9000	12510	500	695	13205
Olives farms	92	3	276	30	50	4500	414	200	18	432
Vegetable and crops	1574	35	55090	10	15	5250	8264	25	39	8303
Green house	905	80	72400	10	20	16000	14480	600	543	15023
Forests	149	5	745	50	5	1250	186	30	5	191
Sandy land	450	-	-	-	-	4000	1800	-	-	1800
Urban areas	1090	-	-	-	-	5000	5450	5000	5450	10900
Total	5646		170211							49854

4. Definition of the Economic Activities, Groups and Regions Susceptible to Severe Climate Change

The project studies showed that all the economic activities are susceptible to the climatic changes. Moreover, other climatic conditions not mentioned in the project studies, such as wind speed, floods, thunder storms, hail storms, and sand and dust storms may affect the economic, social, health and even living conditions of the population. But the incidence of these phenomena is not very frequent, so their effect is relatively weak.

On the other hand, plant and livestock production as well as the water sector are mostly affected by extreme climatic changes, particularly draughts resulting from the decline of rain fall and uneven distribution around the year.

4.1. The economic activities affected by climatic changes

The last chapter was mainly dedicated to present the economic effects of the drought and the other related issues such as:

- The temperature increase above the normal standard in certain periods of the plant growth may lead to the fall of more than 10 % of the cotton buds and reduces the quantity and quality of the product by 50 %. Also it may reduce the sugar content of sugar beet from 15 % to 12 % according to the severity and length of the heat wave.
- The temperature decline below their normal standard result in the frost that affects most fruit trees, particularly apples, citrus and almonds and, consequently, reduces the quantity and quality of the produce.
- Rain and hail storms as well as strong winds lead to the fall of fruit trees buds and damage their crops.

Generally speaking, the agricultural sector is the most susceptible to climate change, whether directly or indirectly. Its ability to meet food, clothing and employment requirement as well its contribution to the balance of payment and the GDP are badly affected with adverse conditions.

4.2. The main affected communities and geographic regions

Concerning the main communities and geographic regions affected by climatic conditions, the project studies and other related studies indicate the following:

- Albadia communities are the most affected groups by the climate change: this is due to the nature of their economic activity that depends of natural grazing for sheep feeding and the related processing and services activities. So, their activities are closely related to rain fall both in Albadia and in other agricultural regions as crop residues are another main source for feed. Around 60 % of *Albadia* population has herds of less than 100 heads, which increases the cost of movement in search for grass and water. This may push some of them to sell some of their sheep, or to migrate to work in construction, or as guards and drivers in urban areas (or in best cases to work as agricultural hired laborers) in order to meet these costs.

- Agricultural producers are also susceptible to these changes, particularly those who depend on rain fed farming in the marginal zones (4th zone), where the rain fall ranges between 200- 250 mm/ year and only barley and grazing crops can be cultivated in normal conditions. The communities of these regions mainly work in rain fed agriculture and sheep and goats production (5-10 heads) and sometimes cattle (1-2 heads).

Despite the fact that the holding size is reasonable enough, its productivity is low and closely related to the favorable conditions, particularly the quantity of rain and its distribution during the season as it is possible to guarantee a good barley crop once every two or three years. Herds mainly depend on crop residues in agricultural areas.

- Generally speaking, some agricultural producers who depend on rain fed farming in the 2nd and 3rd zones, and even in the 1st zone are affected by the rain quantity and distribution, after Albadia and the marginal areas population. Producers of irrigated farming also benefit from good rain fall, which reduces the number of irrigations and feeds ground and river water.
- Concerning drought impact on drinking water and other services in urban areas with high population density, Damascus city, Rural Damascus and Aleppo are the most affected areas. 213 wells of those feeding Damascus and Rural Damascus are not usable anymore due to the decreased water table in Barada and Alawag basin. Accordingly, the future plans will focus on dragging water from the Euphrates or the coastal basin to provide Damascus with drinking water.

It is worth mentioning in this respect that even the drinking water and services in the suburbs have been affected by the droughts of 1999/ 2002 and 2007/ 2008. The average per capita share declined to 1 000 m³/ year compared to the international standard of 7 500 m³/ year. The Arab Organization for Agricultural Development estimates that the Arab average per capita share of water will decline to 500 m³ in 2025 due to the increase population growth and the decline in shared river flows.

It is worth underlining that the data of the Ministry of Irrigation indicate that the Syrian current water balance is negative by 3 104 million m³/year. This will affect meeting the water requirements of all the sectors.

- The northern region, particularly *Al Hassakeh, Deir Ezzor and Albadia* in general are affected by sand storms that become stronger between March and August (12-46 days/ year), which affect the economic and health situation of the region.
- The coastal region, particularly the mountainous areas, is affected by thunder storms and flowage (33-39 days/ year).

Moreover, the coastal area is influenced by the wind storms that result in bad damages for the green houses, leading to financial and agricultural losses.

The strong wind effect also touches fishermen as it damages some boats and reduces the number of fishing days in winter. Moreover, the coastal region communities are affected by the increase of the sea level.

5. Policies and Actions to Reduce the Social and Economic Effects of the Climate Change in Syria

A large proportion of the Syrian poor lives in rural areas and depends on agriculture as a main source of income. So the agricultural and rural development strategy focused on improving the economic and social indicators of these regions. The required policies have been designed to: (i) improve the use of natural resources (land, water, forests and steppes), (ii) optimize the benefits and ensure their sustainability, (iii) combat deterioration, depletion and pollution, (iv) develop agricultural production and provide its inputs, and (v) increase the economic growth rates.

The Syrian government gave significant attention in the strategy of the period 2001-2010 and the 10th five years plan to the reduction of the climatic change effects on the social and economic conditions. Main focus was made on the following issues:

5.1. Desertification and land deterioration combating

The financial and physical support has been provided to the project related to desertification and land deterioration combating such as:

- **Albadia development projects**

- Albadia development project,
- Integrated development project of Albadia,
- Albadia wells establishment and renewal projects.
- Steppe rehabilitation and establishment of natural reserves project.

Some other projects were implemented by Arab and international organizations such as:

- Desertification control and combating in *Albadia (Abdul Aziz Mountain)*.
- Sand dune fixation project in *Alkisra* region of *Deir Ezzor*.

In addition to the establishment of two desertification combating institutes in the most deteriorated areas (*Palmyra and Deir Ezzor*). Moreover, a faculty specialized in land deterioration and desertification combating is under establishment in the Easter region.

- **Forestry development projects**

- Forests development project.
- Forests establishment and development project.
- Forest establishment and fire combating project.

- **Other projects:**

- Reclamation of salinated lands in the Euphrates basin.

- Environmental surveys of natural resources.
- Bio-diversity conservation.
- Meteorology stations establishment.
- Environmental monitoring stations around the country.
- Early warning system for drought.

Moreover, Decision no. 27/ T of 2008, issued by the Ministry of Agriculture and Agrarian Reform, to initiate the Rural Development Project in the North Eastern Region. The project is conducting studies related to poverty alleviation and employment generation by means of micro credits offered in coordination with the Agricultural Cooperative Bank. It will also assist in providing the modern irrigation equipment, processing and marketing of agricultural products, conserving natural resources, developing rural women and supporting agricultural, social and economic services in the region.

Furthermore, considerable attention is being given by the agricultural annual plans to the land utilization improvement and deterioration combating in accordance with the climatic changes that affected Syrian during the last period.

- Producing an environmental map that defines the optimal production regions for crops and fruit trees according to the land classification outcomes and the related comparative advantages.
- Optimizing the use of cultivable land and the adoption of the cropping structures and crop rotations that ensure production sustainability and compatibility between plant and livestock production.
- Rationalizing the use of natural resources and ensuring their sustainability.

Moreover, the agricultural plan of 2008/ 2009 focused on the following:

- Maintain the ban of rain fed cultivation in the 5th zone.
- Maintain the ban of cotton cultivation in some regions and reduce the summer crops cultivation in accordance with the sustainability of the natural resources.
- Reduce intensive crops cultivation in areas irrigated from wells.
- Maintain the decision related to fruit trees cultivation.

These projects and policies are effective in mitigating the negative impacts of climatic changes and land resource deterioration. Accordingly, they should be maintained, evaluated and modified according to the requirements of the changes that took place recently.

• **Water resource rationalization**

The national water strategy included in the 10th five years plan focuses on water security as a contributor to sustainable development. Efforts are given to ensure rational use of water as a strategic resource.

The water resources five years plan focuses on the following objectives:

- Improving the irrigation water use efficiency by the rehabilitation and modernization of the irrigation systems.
- Ensuring proper surface water management, with particular reference to the Euphrates and Tigris.
- Improving ground water management and controlling irrational use.
- Protecting the environment from pollution by sewage water treatment and utilization. Moreover, the water strategy includes the legislative and administrative regulations needed to face the challenges related to water source scarcity and quality deterioration.

The Ministry of Irrigation is responsible for monitoring water sources and controlling the management and planning of their utilization. It coordinates with the related authorities, establishes the public irrigation networks, and licenses wells. The Ministry of Agriculture and Agrarian Reform, on the other hand, regulates water use at farm level, while the Ministry of Housing and Public Utilities provides drinking water and sewage services. Water resource management is subject to several laws and legislation. The most important is the legislation modified by the parliament in October 2005. It mainly summarizes the water legislation and allows the Ministry of Irrigation to involve the private sector in the various activities. Moreover, the Ministry of Irrigation was restructured in order to be able to meet the threats of water scarcity. The General Establishment for Water Sources was established to replace the Water Basins Department. Furthermore, other departments were created to implement the water sources strategy.

Syria is endowed with various sources of water. It has 17 rivers, the biggest of which is the Euphrates. The Euphrates dam is the biggest of the 155 dams available in Syria with a total storage capacity of **18.629 million m³**. In general terms, dams are the most significant water use rationalization tool. Actions are taken by the authorities concerned to insure rational use of water sources, distributed on seven water basins, such as:

- Mapping water sources according to basins to define the renewable sources and design the related investment plan according to the relevant studies on the various water uses.
- Studying the water basins that have not been studied before.
- Establishing the Water Research Center in the Ministry of Irrigation to conduct irrigation, land reclamation and ground water research.
- Increasing the number of projects concerned with surface water use.
- Establishing the Rain Invoking Department in the Ministry of Agriculture to increase the rain fall.
- Adopting the right credit policy to assist farmers in the introduction of modern irrigation technologies.
- Creating water treatment stations to treat sewage water to be reused for irrigation.
- Establishing the General Commission of Al Ghab Management and Development under Law no. 20 of 2005 for the development of Al Ghab and maintenance of the irrigation schemes.

Moreover, various projects were implemented with the aim of enhancing the water resource use efficiency and to maximize the productivity of water unit:

- *Natural resources research development project.*
- *Al Ghab irrigation and sewage operation and maintenance project.*
- *Conversion to modern irrigation fund.*
- *Establishment of climatic monitoring stations in cooperation with JICA.*

In support of these projects, various other projects were implemented with the Food and Agriculture Organization in the area of irrigated farming with the following objectives:

- Irrigation sector management strategies and policies.
- Capacity building and training in the area of irrigation and water conservation and the provision of supporting services.
- Introduction of modern irrigation technology to improve the efficiency of irrigation on the farm level.

At the end of this section, we should refer to the establishment of the National Fund for Conversion to Modern Irrigation in order to rationalize water use, particularly ground water, and to accelerate the conversion process. The fund was established under Decree no. 91 of 28/ 9/ 2005 with the aim of converting 1.2 million ha of irrigated land to modern irrigation during a period of 10 years. An amount of SP 72 billion (US\$ 1.5 billion) was allocated for this purpose, out of which SP 20.9 will be used for the rehabilitation of public irrigation schemes, while SP 52.2 billion will be offered as soft credits to producers and farmers to cover the cost of modern equipment procurement and installation.

According to the estimations of MAAR, the use of modern technologies will reduce the used water by 50 % and increase the yield by 25- 35 %.

During the last two years, the area irrigated by modern technologies increased from 10 % to 18 % of the total area thanks to the above mentioned Fund.

Efforts should be maintained, however, to achieve the full objectives of the Fund during the minimum period of time.

In general terms, these measures and policies should be further enhanced and evaluated with the aim of improving their efficiency and to cope better with the climatic changes effects.

5.2. Follow up of the outcomes of the World Food Summit

In October 1996, the FAO organized a meeting for the world leaders called the *World Food Summit* with the aim of giving the government, international organizations, and NGOs the opportunity to mobilize efforts to achieve food security. As an outcome of the summit, seven commitments were made to deal with the food security problem and to half the number of people suffering from hunger and malnutrition around the world (that reached 8 million persons in 1995) by 2015.

Most of these commitments refer to the close relation between climate change and food security, hunger and health, particularly in rural areas.

Making some achievements in the above mentioned goals will reduce the impact of climatic changes. *The following section refers to some of the commitments directly related to development in general and the climatic changes in particular. It also presents the progress made in terms of policies and actions that need to be implemented to achieve these obligations:*

Commitment three: *“we will pursue participatory and sustainable food, agriculture, fisheries, forestry and rural development policies and practices in high and low potential areas, which are essential to adequate and reliable food supplies at the household, national, regional, and global levels, and combat pests, drought and desertification, considering multifunctional character of agriculture.”*

This commitment is being implemented in Syria by:

- ✓ Designing policies and actions aiming at agricultural production intensification and diversification.
- ✓ Implementing actions aiming at mitigating the environmental impacts on food security.
- ✓ Enhancing technology transfer and utilization.
- ✓ Focusing on integrated rural planning.

Commitment five: *We will endeavor to prevent and be prepared for natural disasters and man-made emergencies and to meet transitory and emergency food requirements in ways that encourage recovery, rehabilitation, development and a capacity to satisfy future needs.*

This commitment is being implemented in Syria by:

- ✓ Establishing a national disaster combating committee to offer the required support to the population affected by natural disasters. The committee is composed of representatives of all the related ministries and chaired by the Deputy Prime Minister.
- ✓ Informing the farmers, by the Ministry of Agriculture, about the expected frosts to take the required precautionary actions, thanks to the established meteorology stations.
- ✓ Designing a project proposal on drought combating and early warning system and taking actions to secure the required funding.
- ✓ Obtaining new drought resistance plant and livestock varieties.
- ✓ Establishing forest roads for the combating of forest fire combating stations are being increased.
- ✓ Distributing food aid by the World Food Programme to the poor and those suffering from food insecurity.
- ✓ Offering emergency assistance to destitute farmers affected by the bad weather conditions.
- ✓ Implementing the food insecurity mapping and poverty mapping in cooperation with international organizations.

Commitment six: *We will promote optimal allocation and use of public and private investments to foster human resources, sustainable food, agriculture, fisheries and forestry systems, and rural development, in high and low potential areas.*

This commitment is being implemented in Syria by:

- ✓ Increasing the share of human resources development in the national budget.
- ✓ Increasing the share of agriculture, fisheries and food security programmes in the national budget.
- ✓ Increasing the share of infrastructure investment to enhance market access opportunities and food accessibility.
- ✓ Enhancing sustainable management strategies of water sources and the related investments.

In general, the Syrian economic policies mentioned in the introduction of this report and the on-going development projects as well as the official commitments, have contributed to mitigating the environmental impacts in general and the climatic impacts in particular on the social and economic conditions. This particularly applies to food security and water security.

6. The Government and Administrative Units Ability and Capacity to Deal with Natural Disasters

The study indicated that the main climate change that affect Syria are the decline of rainfall and increased temperature, and the related effects on natural and human resources (particularly water resources), land deterioration and droughts.

Droughts hit Syria on regular frequency and recurrent basis and the wave of 1998/ 1999 was one of the most severe droughts. It had big negative influences on the agricultural production in general and on the economy in particular. Also, the period 2007/ 2008 was one of the climatically critical periods. A set of measures have been taken to mitigate the effect of this natural disaster such as:

- The Ministry of Economy and Trade used the strategic wheat stock to cover the production shortage of 1.5 tons of wheat/ year. It provided bakeries with the wheat flour needed to cover the demand on bread.
- The Ministry of Agriculture and the WFP provided flour and canned food to big segments of the population in the marginal areas and the 4th zone as well as rain fed wheat farmers.
- The Ministry of Agriculture offered, through the General Establishment for Feed, long term in kind loans (additional feed rations) to cover the demand on sheep and cattle feed in Albadia and some other rain fed farming areas.
- The Ministry of Agriculture offered, through the Department of Animal Health, free vaccinations and veterinary medicines to increase the herd ability to resist the drought related diseases.
- The Ministry of Agriculture and the Ministry of Local Administration offered water for humans and livestock to the communities of the 4th and 5th zones to cover the shortage resulting from the low rain fall. Moreover, the Ministry of Irrigation deepened the drinking water wells in many areas of the country and it

is digging additional wells, particularly in Damascus, Rural Damascus and Aleppo.

- The Ministry of Finance and its banks exempted all the economic investments, particularly sheep breeders, from the payment deferral interests and rescheduled the original loans.
- The Ministry of Agriculture opened, through the Department of Albadia, Steppes and Sheep, some of the grazing reserves according to a grazing plan to mitigate the effect of the severe feed shortage.
- Moreover, the Ministry of Agriculture and the Ministry of Local Administration took actions to improve the environment by means of green belts, planting large mountainous areas (state land) around the cities with forest and fruit trees. These actions moderated the weather and provoked rain. Additionally, the annual plans of MAAR for pasture seeds sowing and planting pastoral seedlings in the areas of sand storms as a tool for sand dune fixation and environmental conditions improvement.
- The other climatic conditions are less risky and have fewer impacts:
- **Sand storms:** T storms have limited effect, which is mainly restricted to the northern regions and Deir Ezzor and Al Hassakeh. The Ministry of Health and its related units focused on children vaccination and the distribution of the medicine needed to protect the communities from the drought influence on public health and to prevent the diseases caused by drought and sand storms, particularly breathing diseases.
- Syria is subject to wind, thunder and rain storms that lead to floods in the coastal areas. In some cases, these floods cover some buildings and damage some infrastructure (buildings, bridges, roads). They also destroy some crops, green houses and small fishing boats. Normally the administration units help in mitigating the effects of these incidences and compensate farmers and fishermen, either by the local aid or from the state marginal budget.

The other disasters like earthquakes, strong storms, or big floods happen very rarely. The related institutions like the administration units, remote sensing and earthquake stations organize awareness campaigns on the related potential risks.

Moreover, the fire combating units under the Ministry of Interior and the technical departments of the Ministry of Local Administration offer the required support, if needed.

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