



7 Climate Changes and Protection of Ozone Layer

7-a Introduction

It has become evident to decision makers, energy and water resource professionals and the like in Egypt that we are facing alarming climatic changes that command more caution and further examination to determine the present conditions as well as the adverse effects of such changes on all aspects of life, along with the measures to be taken to avoid dangers. Climatic Changes indicators include:

1. An increase in surface air temperatures all over the globe; the global average increased by 0.3 to 0.6 % last year.
2. Change of temperature average distribution and rainfall rates in many zones.
3. Increase of hot waves and storms in many areas. Different scenarios of adverse climates indicate that a remarkable drop of the Egyptian national crop production is likely to take place, in addition to the negative effects of rising of

water temperatures on the Red Sea coral reefs.

4. Decrease of Nile water resources in some years to an alarming degree.
5. Rise of Seawater level, some research and studies supervised by the Climate Change Unit – the Egyptian Environmental Affairs Agency – indicated that this will probably cause significant zones in the Delta to be flooded threatening with loss of populated fertile lands.

7-b Actors, Pressures and Impacts

Several research and studies proved that climate changes occur due to high emission rates of Green House gases (GHGs), Carbon Dioxide (CO₂) in particular, Methane in addition to other GHGs.

These climatic changes are going to induce major effects on different sectors world-

wide. Egypt has taken the initiative to study how far the effects of climate changes are on the different sectors, especially the water resource – agriculture sector and coastal regions, in addition to other sectors such as the Energy, tourism, industry and livestock. These sectors were found to be largely vulnerable to climate changes. Impact on the vulnerable sectors are summarized as follows:

Water Resources

- Adding further pressure on water resources, agriculture and industry.
- Changing amounts, locations and seasons of rainfall.
- Increasing rates of pollution due to increased cases of atmospheric stability.
- World environmental models are still unable to make accurate predictions; however, some studies are conducted on the regional models in a bid to predict venialities of water amounts that are going to reach the Nile River due to climate change.

Agriculture, Livestock and Food Sources

- Less agricultural productivity and food sources (some crops are even more vulnerable).
- Changing the plans of geographical crop distribution.
- Adverse effects on marginal crops, and increased desertification rates.
- Increased demand on water.
- Negative effects on agriculture due to changed rates and timings of hot waves.
- Adverse social and economic effects.

Coastal Regions

- Some low zones in the Nile Delta, and other coastal zones, will be flooded.

- Increased rates of shore erosion and sea water infiltration.
- Increased rates of coastal lands salination, high levels of ground water and low agricultural productivity.
- Changed rates, areas and timings of rainfalls.
- Perturbed fish production due to changed ecosystems in coastal areas.
- Accompanying economic and social effects subsequent to all previous effects.
- Health effects due to water shortage, higher temperatures, higher humidity and higher hot and cold waves.

Tourism

- Adverse effects become even fiercer at high temperatures and changeable weather conditions.
- Putting more pressure on investment areas and both the Red Sea and the Mediterranean Sea coasts.

Energy Sources

- Adding more pressure on energy for domestic air conditioning.
- Increased temperatures could result in increased air speeds, a matter which can be positively utilized in generating air and solar energies.
- Affecting the High Dam-generated energy.

Population

- Coastal populations: (rising sea level, increased rates of storms, rainfall and hot waves).
- Inland populations: (hot waves, unexpected torrential rain, more air-borne dust).
- Social and economic effects.

In Coastal Zones

- Migration of agricultural workforce and fishermen.
- Decreased viable beaches will negatively affect tourist services, the matter which will lead to quick deterioration of such beaches and consequent decreasing rates of tourism and increasing rates of unemployment.
- Heat impacts on archeological sites leads to their rapid deterioration thus to declined tourism rates and increased unemployment.
- Increased unemployment rates lead to political instability.
- Rising levels of ground water lead to increased rates of diseases and monument corrosion.

In Inland areas

- Slums are the most vulnerable to changes of wind and torrents.
- Rising temperatures raise infant mortality rate.
- Rising humidity rates increases the feeling of discomfort, reduces labor efficiency and productivity and minimizes tourism and buildings and monuments life cycle.
- Rising temperatures raise soil erosion rates and minimizes the potentialities of cultivating marginal areas.
- Increased rate of wind speed and rising temperatures raise rates of dust, the matter which negatively affects electric equipment and increases rates of fire accidents in rural areas and slums, as well as giving rise to road accidents.
- Negative health effects due to heat, dust, humidity and wind speed.

Ozone Erosion

The Ozone layer depleted due to using syn-

thesized chemicals and increased use of ozone-depleting gases. Found in the stratosphere, the ozone is the layer that contains the ozone gas among the atmospheric components.

The ozone lies at altitude 10 to 18km from the earth's surface, at the nearest end. It is 3 to 4km in thickness. The ozone layer protects living organisms on Earth from the receiving the harmful ultraviolet rays. Among the most important chemicals that damage the Ozone layer:

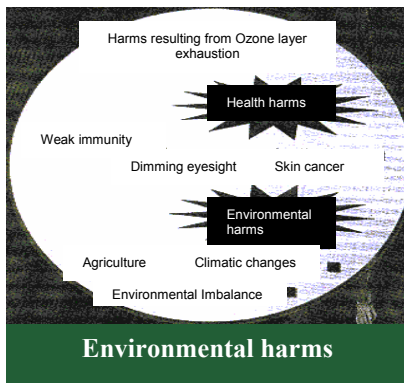
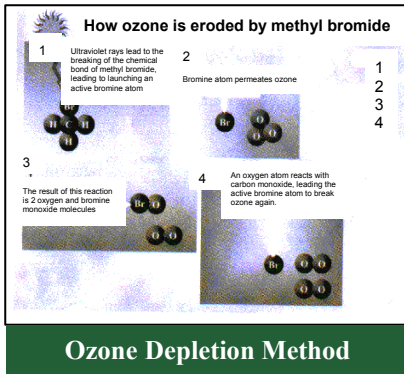
- The chlorofluorocarbons and the hydrochlorofluorocarbons (HCFCs) used largely in domestic, commercial, and industrial coolers and air conditioners.
- Halons used in fire fighting and air conditioning systems.
- The Methyl Bromide, used as an insecticide, in storing agricultural crops and sterilizing agricultural soil.

How does Methyl Bromide deplete erode the Ozone layer?

A methyl bromide particle consists of three hydrogen atoms, one carbon atom, one bromine atom. While an ozone particle consists of 3 oxygen atoms in the high atmospheric layers. The bromine atom disintegrates due to the ultraviolet effects. It interacts with the ozone particle resulting in disintegration of the oxygen atom from the ozone particle that turns into an oxygen particle, the matter which leads to depletion of large amounts of the ozone. It is noteworthy that the Chlorine atom found in the chlorofluorocarbon (CFC) compounds has a detrimental effect on the ozone layer.

Environmental damages resulting from the ozone layer are largely reflected in the climate changes to the globe, and the ecological imbalance ensuing, whereas health det-

riments are reflected in the spread of leukemias, impairing human natural immunity and causing some ophthalmic diseases such as the glaucoma.



7-c Government Efforts to Address Effects of Climatic Changes and Ozone Depletion

Addressing Climate Change

Given the significance of the Climatic Changes problem, an urgent need to develop Egyptian national policies emerged to address this problem, particularly for the potential impacts on Egypt. Within this framework, several seminars have been arranged. Politicians, organizers, researchers, and environment-related NGO members participating these activities. The proceedings of these seminars tackled the issue of climatic changes, and more specifically to Egypt, the anticipated impacts, necessary strategies, and the Egyptian ne-

gotiating situation as well as its obligations within the framework of the Convention of Climate Changes and the role of relevant bodies. The issue of climatic changes has been placed on top of the list of national concerns, out of the concept that Egypt is vulnerable to climate changes according to international reports. This also gave rise to the need to obtain well-defined contributions in all fields - training, education, communication, raising awareness regarding scientific and economic dimensions of the Climatic Changes phenomenon. As well, an urgent need has emerged to open up opportunities of international cooperation in terms of clean technology.

On the other hand, some obligations ensuing from signing the framework Convention on Climatic Changes stipulated submitting the national communication report and realizing integration between the development policy in Egypt and climate changes. In addition to awareness raising, and preparing national human cadres capable of tackling all aspects of the issue in question, as well as defining policies and programs required for addressing such an issue. This was done in the Initial National Communication submitted to the UN 1999. Noteworthy, however, that many measures have been taken to control green GHGs at the different sectors in Egypt.

Egyptian Actions As Regards Climatic Changes at the International Level

Given the serious and critical nature of the negative effects of climate changes on all aspects of life, constant follow-up of this phenomenon as well as effective participation in international fora were inevitably necessary. Egypt had a remarkable role in international fora, especially as regards the

following proceedings:

- Coordinating and cooperating with the G-77 and China, and supporting all attitudes that are consistent with the national interests.
- Further demanding industrial countries to necessarily fulfill their obligations contained in the Convention on Climate Change, particularly those on assisting developing countries through technology transfer and capacity building as well as providing insurance necessary for controlling the adverse effects of climate change.
- Reaffirming disapproval of incorporating any mechanism for imposing obligations on African states.
- Reaffirming refusing attempts of some industrial countries to link adaptation to effects of Climatic Changes with the Climatic Changes mitigation measures.
- Reaffirming the need to put article 2 (paragraph 3) of the Kyoto Protocol on the adverse effects of the response measures.
- Calling for encouraging and employing new CO₂-absorption technologies. Motivating research and studies centers and universities to coordinate in order to conduct studies on Climatic Changes and ensuing impacts on the Arab region.

Given that emissions ensuing from human activities are the actors of climate changes, Egypt has put climate changes in perspective in terms of lack of certainty and the probable impacts they may have on all sectors of the society. To this end, Egypt has adopted two basic principles: a no-regret policy and the precautionary principle in development planning. In 1992, Egypt signed the Framework Convention on Climatic Changes (UNFCCC), and ratified it on December 5, 1994 - and set up a pri-

mary inventory of GHG emissions. A number of studies have been conducted to determine how far water resources, agriculture and coastal zones are affected by climate changes. These studies referred to the need to take into account the vulnerability of these sectors to climate changes in future development plans. Through this Convention, necessary human cadres were prepared. Egypt has participate in meetings of the contracting parties on climate changes, ever since the Berlin Conference 1996, and set up the Climatic Changes Committee out of representatives of relevant ministries at the highest levels, thus leading to form human cadres necessary for developing anti-Climatic Changes policies.

Within this framework, Egypt issued in 1999 the first national communication report to the UN secretariat which contained an inventory of GHGs and the means to control them, and adaptation to adverse phenomena, as well as the national precautions necessary for addressing this phenomenon. The Egyptian government has also developed the national plan of action in August 1999 that involved a careful definition of policies to be adopted by in areas of energy, agriculture, water sources and wastes among others.

Over the last period, Climate Change Unit focused activities on supervising and following up several projects associated with the aspects of emission sources, in addition to the policies to be taken to control adverse effects.

Central to these adverse effects are:

- GHGs inventory and economic assessment of reduction. It was made clear that total emissions amounted to 116.608 Gega gm CO₂.
- Capacity building of national capacity in terms of climate changes. This pro-

ject was concerned with training national capacities to be able to fulfill obligations ensuing from signing the Framework Convention on Climate Change.

- Energy and environment review. Of the most significant outputs was the present policy analysis in the area of energy, as well as studying adverse impacts ensuing from application of these policies. The project has applied the cost-benefit analysis methodology.
- An experimental project for converting gasoline-operated engines of motorcycle to natural gas-operated engines. Among the most significant outputs of this project are reaching a possibility of controlling GHGs ensuing from operating motorcycle with liquid fuel.
- Recovery the methane gas emitting from sanitary land filling.
- GHG inventory of sanitary landfills. Results indicated that average percent of the methane gas is almost 30%.
- National Study for Clean Development Mechanism aiming to prepare an integrated group of projects that can be implemented through this mechanism, and institutionalize the project implementation mechanism, as well as studying promotion of Egyptian projects in the world market.

Presently the Regional Project for Cleaner Production Mechanism is being put into force in Egypt through projects provided by the developed countries with view to buying out quotas of GHGs from developing countries. As well, a project of introducing electrical and hybridized automotive technology is underway; this project is likely to have a great significance in controlling car-generated pollutants.

7-d Egypt's Obligations towards the Protection of The Ozone Layer

Egypt has, on its part, ratified the Montreal Protocol, and the amendments made thereto, which is mainly concerned with preserving the Ozone layer though gradual reduction of producing and consuming Ozone-depleted chemicals.

Developed countries give support to developing countries to ultimately end using substances causing erosion of the Ozone layer.

The Egyptian Ozone Protection Program has been developed to include various industrial and commercial activities that dictate applying alternatives as well as the draft general rules and decisions for fulfillment of Egyptian obligations.

The Egyptian program includes several industrial and agricultural sectors: the foam industries, solvents, refrigerants. Training was given to develop the capacity of those working in maintenance of refrigeration units; a trainer manual for trainees and technicians was set.

Fulfilling its obligations towards the Montreal Protocol and preserving the ozone layer, Egypt had to orchestrate all efforts to realize this national goal.

Role of the State Ministry for Environmental Affairs

- Forming the National Ozone Committee with representatives from all bodies concerned with view to coordinating between the different sectors.
- Supervising implementation of projects of alternatives and activities funded by the ozone fund in Egypt. The Ozone Fund has given finances to several pro-

jects aiming at limiting the use of Ozone-depleting materials. In the area of air conditioning and refrigeration, the Fund has provided finances to the Egyptian CFCs Control Program used in conditioning and refrigeration, using instead Ozone-friendly, CFC-free alternatives: all refrigerators manufactured in Egypt are free from CFCs. The Fund has also assisted financially in building the halon bank, an Ozone-depleting material that is most destructive to the Ozone layer. The depleting capacity of the halons is ten folds the depleting capacity of CFC compounds. There are dozens other projects in the different areas of industry that aim at minimizing the use of Ozone-depleting materials that will receive financial support from the Fund in the next period. Funding had a significant effect on successfully developing the Egyptian strategy for controlling the use of Ozone-depleting substances and supporting the objectives and items of the Montreal Protocol, an example to be followed in international fora.

Role of the Ministry of Industry

- Adhering to the conditions contained in the Montreal Protocol and the applications thereof in cases of approving establishment of new industrial units.
- Contributing to application of control on imports and use of Ozone-depleting substances.

Role of the Ministry of Foreign Trade

- Foreign trade sector is responsible for applying law# 118 of 1975, and finding the legislative mechanism on export and import control and the necessary environmental conditions.

- Regulations of law no. 275 of 1991 ban importing sets or equipment that depend on any Ozone-depleting substance.

Role of the Ministry of Agriculture

- Results of lab research conducted in institutes of the Ministry were provided to find alternatives for the methyl bromide such as the Metam-sodium, Bezamite and Phosphine.
- The Ministry pays much attention to the environmental dimension in all research or executive plans, particularly those related to insecticide.

Role of the Ministry of Finance: Customs Authority

- The customs authority implements all decisions and instructions of the different state agencies in order to protect the national economy pursuant to the presidential decree no. 80 of 1994 containing amendments to the Montreal Protocol on Controlling Ozone-depleting materials.
- The customs authority has issued import manifestos of Ozone-depleting materials that are subject to control, for example: AC units, coolers, aerosols, fire extinguishers in accordance with the provisions and decisions of Montreal Protocol and the amendments thereto.
- As early as the instructions were given, the customs authority has totally banned releasing any shipments using Ozone-destructive materials except after they have been reviewed and approved by the EEAA.

7-e Future Vision

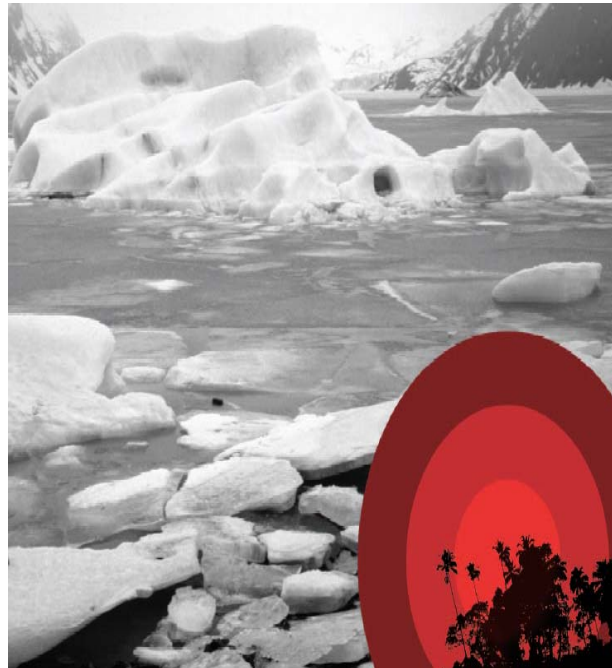
Within the Framework Convention on Climate Change, Egypt has been exerting con-

tinuous efforts to reduce emissions at all sectors, particularly limiting green-house gases emitting from national industries, as well as identifying economic viability, as a large amount of these industries could be implemented with a negative incremental cost.

It is also exerting sustained efforts to make use of renewable energies, such as wind and solar energy, in addition to recycling wastes and utilizing resulting emissions. The State Ministry for Environmental Affairs pays great attention to reducing emissions; it has also started auditing inventory in the different sectors, geared efforts toward utilizing tools of clean development, mechanism, forming cadres of regional model studies to specify the impacts at all sectors, and developing appropriate adaptation and addressing policies.

Observing its obligations under the Montreal Protocol and the amendments thereto regarding protection of the Ozone layer, EEAA has set the outline of the following phase:

- Tackling all illegal practices of conditioning and cooling equipment using Ozone-depleting materials.
- Proceeding with conversion training as well as programs on materials recycling and encouraging relevant units to employ modern technology through making use of technical assistance available in addition to specific awareness raising programs .
- Gradually shifting towards using alternative substances to ozone-depleting. Upgrading efficiency of AC users and raising awareness of farmers to use the Bromide Methyl alternatives in agriculture to conserve the environment.



7-f References

Research

1. El-Shahawy, M.A. et. al: Studies on Thermodynamic Aspects Associated with Different Conditions of L.T.C.Z. Cloud Band. Inter. Sem. On Clim. Fluct, Italy, 1989.
2. El-Shahawy, M.A. et. al: Effect of Tropical Atmospheric Disturbances on Activity, L.T.C.Z Inter. Sem. Clim, fluct, 1989. Cairo.
3. El-Shahawy, M.A. et. al: Climatic Anomalities over Africa ad El-Nino with Special Reference to the Nile Flood. Inter. Sem.Clim., fluct, 1989. Cairo.
4. El-Shahawy, M.A. and Mehanna A.M.: Climatic Impacts on development of the Egyptian Northern Coast. Tskuba-Japan, 1991. Proc. Inter. Conf. On Climate Imp. On En. & Soc. Cies. World CI. Programme.
5. El-Shahawy, M.A. and El-Rafy A.M.: Energetic Interaction Leading to African Droughts during El-Nino Periods Pro. LRWPR- Treiste-ITALY, 1991.
6. El-Shahawy, M.A.: Some Impacts of Regional Warming. Proceedings of the International Conference "ICID" Fortaleza- Brazil, Jan., 1992.
7. El-Shahawy, M.A.: Impact of Climatic Changes on Arab Region. Proceedings of 1st Bahrain Conference on Environment, State of Bahrain 24-26, Feb., 1992.
8. El-Shahawy, M.A.: Studies on Climatic Changes and Some Impacts on Egypt. Proceedings of the Commission of Climatology of IGU Brno, Czech Republic 1994.

Books

1. El-Shahawy, M: Climate Changes (239 pages in Arabic), General Book Organization, 1995.
2. El-Shahawy, M: Aeronautics and Applications (270 pages), Arab Intellect House, 2000.
3. El-Shahawy, M: Activities of Atmospheric Sciences (130 pages) , Zayed Center, 2002.
4. IPCC: Scientific Studies Report, 2001.
5. IPCC: Feedback, Exposure and Adaptation Studies Report, 2001.
6. IPCC: Policies Adopted for Mitigation of Damage, 2001.

Studies

El-Raey, M.: Vulnerability Assessment of the Coastal Zone of Egypt, to the Impacts of Sea Level Rise, 2002.

Projects undertaken in EEAA under supervision of the Climatic Changes Unit

1. Green House Gases inventory and Economic Assessment of Reduction, UNEP/VTT.
2. United States Capacity Studies Program (USCSP).
3. Support for National Action Plan (SNAP).
4. Capacity Building of National Capacity in Climatic Changes (Phase I).
5. Capacity Building of National Capacity in Climatic Changes (Phase II).
6. National Strategy Study for Clean Development Mechanism.
7. Energy and Development Review.
8. CIDA, GHG Emission Reduction Strategies for Solid Waste Sector in Egypt.
9. CIDA, GHG Emissions Reduction Strategies for Solid Waste Sector in Egypt.
10. Egyptian Motorcycle Conversion Project.
11. Capacity Development for the Clean Development Mechanism.