Global Climate Change and Impacts on Natural Resources

Introduction

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The International School on Disarmament and Research on Conflicts -ISODARCO- has organised, since 1966, residential courses on problems related to international conflicts. After the Kyoto conference it was decided that the problems related to climate changes due to anthropogenic causes, and their impact on natural resources, might be a relevant source of international conflicts in the not too distant future. For this reason Isodarco decided to organise a summer course on "Global Climate Change and Impacts on Natural Resources". This decision was triggered by the following considerations:

a) There is new and stronger evidence that most of the world warming observed over the last 50 years is attributable to human activities.

b) Any large warming would be detrimental to all parts of the world in economic, agricultural productivity and water resources terms. Ecosystems are also vulnerable to the projected warming and human systems are quite sensitive to it. Vulnerability and impacts on food and fresh water provision, as well as on health, are becoming critical in many areas.

c) Environmental changes may lead to serious socio-economic consequences and in some cases to conflicts. In the framework of environmental, economic and social sciences, proper options shall be found to guarantee economic growth and sustainable development and at the same time mitigation of climate change, while costs can be minimized by timing these actions appropriately.

The presentations and discussion within the 2001 Candriai Summer School can be broadly divided in the following categories:

Scientific basis:

Bonino G. : *Climate Changes on 10-10^5 years Time Scales*

Casale R.G. : Siani A.M. : *Stratospheric Ozone, UV and Climate Change*

Fiocco G. : *The Role of Aerosols in Climate Change*

Palmieri S. : *Climate Fluctuations in the Mediterranean*

Severinghaus J.: *The Record of Past Abrupt Climate Change*

Somerville R. : *Problems and prospects for improving climate models*

Valentini R. : *Carbon Fluxes and Carbon Budget in the Atmosphere*

Impacts:

Camuffo D. : *Climate Change and Coastal Effects: Venice as a case study*

Cegnar T. : *Heat Waves and Human Health*

Gommes R. : *Climate Change Impacts on Agriculture and Food Supply*

Lo'ay Froukh : *Climate Change: Impacts on the Groundwater Resources of the West Bank*

Sciortino M. : *Desertification and Soil Conservation, the Climate Change Challenge*

Severini M. : *The Impacts of UV on Biosphere*

Suarez P. : *Climate Change: Regional Development and Equity: A look at the Idrovia Navigation Project*

Social stresses, vulnerability, mitigation, international agreements and economic, public education:

Edesess M. : *Global Climate change: International Agreements and Economic*

Hassol S. J. : *Science, Public Education and Policy*

Kelly H. : *Climate Change: Economic Growth and Sustainable Development through Advanced Technologies*

Stonich J. S. : *Climate Change, Human Dimension and Policy as seen by an Anthropologist*

Turton A. : *The Construction of Knowledge and Implications for the Climate Change Debate: a Perspective from the Developing South*

It would be very hard to give in a few lines a summary of the School achievements. Several questions and some answers may be found consulting the specific papers. Candriai, a nice mountain site in an Alpine wood, together with the splendid school hospitality, contributed to the success of the initiative: after having listened to a bright lecture on carbon fluxes everybody realised to be in a…. silent natural factory where CO_2 was continuously converted into…. sugar.

Although human activities certainly contribute to the carbon increase in the atmosphere, burning of fossil fuels and deforestation being primary causes, the carbon cycle within the climate system is not entirely understood and the international network of observing stations was described to give an answer to the so far open questions.

In the session dealing with scientific basis, and particularly with climate simulation models, a number of uncertainties have been mentioned, such as the role of clouds and aerosols which affect results with a shade of doubt: clouds are vital in modulating the water vapour response to the greenhouse effect, while aerosols cause a direct climate forcing by reflecting sun light and indirectly by modifying cloud properties: both these elements are neither modelled in a reliable fashion, nor exhaustively monitored on a global basis. The point was raised about the role of non CO_2 greenhouse gases in stimulating the global warming and to the feasibility of a strategy to mitigate global warming by reducing non CO_2 gases (tropospheric ozone, methane) and black carbon aerosols. Some hope on the possibility of seasonal climate forecasting in a very delicate area like the Mediterranean, in which the "climate stress" is expected particularly serious, was offered by the interpretation of the regional climate history in the past 50 years and by the tele-connections between climate parameters and various atmospheric circulation indexes.

Impacts of global warming in various fields were considered and analysed by some lecturers, impressive were coastal effects in reference to the problem of Venice, impacts on the biosphere and human health, the latter with reference to heat waves. Desertification, now affecting southern Europe as well, has been exhaustively and dramatically described also by means of a film titled "Deserts in Europe".

The last session was concentrated on social stresses, vulnerability, mitigation, international agreements and economic, public education: it was particularly effective in analysing and relating various aspects of global warming, with reference to the " hated and blessed" Kyoto protocol, whose positive and negative aspects were deeply discussed. The public education on the global warming topic and the delicate role of media was also singled out.

The integration among experts of various science branches involved in the problem and the many graduate students from various parts of the world attending the course, was confirmed by a number of deep, interesting, constructive questions and discussions. As we have seen, uncertainties in understanding climate processes are present. Luckily, doubt is the fuel of the science engine and research shall continue, particularly in the area of climate modelling and data collection to reach a level to better contribute to policy decisions.