



**SMALL STATES
CONFERENCE ON
SEA LEVEL RISE**
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MAURITIUS
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Delivered by

Hon. Sir Ramesh Jeewoolall
Minister of Housing, Lands and Environment
of Mauritius

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SMALL STATES CONFERENCE ON SEA LEVEL RISE

The compelling need which has brought the small states at this conference, is to increase our knowledge base, underlying major policy decisions on societal and national behaviours that affect global well-being. already third world countries are paying a heavy-price for global climatic changes caused by the industrial activities of rich nations. Desertification is still proceeding at an increasing pace claiming arable lands and human lifes. Changing rainfall patterns is leading to the destruction of marginal food production areas and disruption of food distribution systems. We are now facing a rising sea which will claim millions of acres of coastal and lowland areas. Not only that coastal residents will have to relocated, but we will not be able to afforded the billion-dollar expenditures required to construct bulk heads and other coastal structures to prevent massive erosion. Our port facilities will use their utility in the face of more frequent storm surges and hurricanes. Sea water intruding into estuaries and aquifers will make the esturies inhospitable breeding grounds, and the aquifer waters unfit for human consumption. Destruction of wetlands which are the habitats of countless animal and plant species will impose significant but unknown effects on food chain.

Scientists and policy makers respond to uncertain predictions of global warming in basically three ways. Some say that the warming projects by even the most conservative models is so severe that fast action is necessary now to reduce its impact on the

atmosphere. Others believe that reducing emissions of greenhouse gases is so difficult and involves so many activities that are basic to human life, such as cooking with fire-wood or growing rice, that global warming will be nearly impossible to slow down. Still others hold that there are so many uncertainties involved in global warming that scientists cannot possibly predict what the consequences will be. There is no simple significantly correct view of what should be done about greenhouse warming. Several of the strategies proposed are to reduce deforestation in the tropics, increase energy efficiency, stop production of CFC's, cut down production of other greenhouse gases, develop renewable alternatives to fossil fuels and stabilise our populations.

Reducing deforestation in the tropics is valuable because it would help preserve the rich abundance of species and stop some of the negative climate changes resulting from deforestation. More efficient use and production of energy - by using more efficient factories is also beneficial. Halting and cutting back the production of CFC's and other halocarbon may effect the food balance of some countries relying on cold stores food conservation systems. However cutting emissions from greenhouse gases to lessen global warming is extremely difficult. The annual emissions of carbon dioxide (weighed as carbon) is 5 tons for every man, woman and child in the U.S. compared to less than 1/10 of a ton in a small state. To develop economically, poor countries will be forced to increase their emissions substantially.

Getting a better idea on what the environmental effects of global warming might be and when and how they might occur is an enormous and costly undertaking. The answers policy makers from third world countries have been seeking, have been slow in coming. Part of the delay can be laid at the foot of technology - the lack of tools such as monitoring equipment and large computer models that can integrate all the important component systems. Supercomputers are used to solve equations that estimate winds temperature, sunlight, relative humidity and precipitation for each country on the globe. All the models developed so far have some basic problems. A great variety of atmospheric chemistry and physics goes on within the actual atmosphere. For example, tropical cyclones or hurricanes, major mountain ranges, industrial pollution, changes in cloud type and volcanoes have a great influence on climate. All climate modelers admit, more over, that the models have serious deficiencies that could cause variability in their predictions of greenhouse warming and could make the results unreliable especially for the small states. A number of factors have not been taken into consideration in those global climate models are clouds, ocean heat capacity, microscopic life, and deep circulation, variable solar energy output etc.

The oceans are still basically uncharted territory. Readings of ocean circulation and temperature are taken only sporadically. Consequently climatologists know much more about the dynamics of the atmosphere than about the dynamics of the oceans. Climate modelers now agree that predictions of subcontinental effects

will remain highly uncertain until a coupled ocean-atmosphere model can be created. This model will however demand computer power beyond the capacity of third world countries. Small states should be involved in the World Ocean Circulation Experiment - an international effort that begins in 1990. It will take 10 to 20 years before computers that can handle the large amount of data associated with the atmosphere - ocean model.

In spite of these uncertainties the overwhelming consensus among scientists studying climate change is that the chemical forces that will alter climate during the next century are starting to do their damage now. Pressure is thus growing on a number of governments to begin taking immediate steps to establish policies of adaptation to the inevitable changes. As this is policy making on a grand scale and on an international level, it isn't easy. Alleviating disaster can come about only if enough countries act.

In the advanced countries, pressure to establish policy have their origin in well established groups. Some of these groups have used legal means to force the Environmental Protection departments to regulate CFC's or to carry out independent studies, like the Worldwatch Institute on the ecological consequences of industrialization. Some of them have prepared ambitious policy documents or active programmes of education and information on global change. The Council of Ministers of the EC have adopted a resolution calling for reduction of carbon dioxide emissions. It have also adopted programmes for reforestations in

Third World Countries as well as programmes to give these countries access to advanced energy know-how. The U.S congress has amended the National Science Foundation's appropriations so as to include a 1991 International Year of the Greenhouse Effect. In the U.S. House of Representatives a Stratospheric Ozone and Climate Protection Act of 1986 was passed. In the U.S. Senate, Senators have introduced a Global Climate Protection Act. We hear that President Bush will appoint an Ambassador-at-large to co-ordinate and lead U.S. participation in the International Geosphere and Biosphere Programme, a newly approved international attempt to understand through satellite monitoring, supercomputer technology, and earth-based research of the dynamics of atmospheric forces. A large number of agencies are running specific missions - The National Climate Programme to oversee climatological research, across several agencies. N.C.P. covers a whole range of climatological issues, from research needs in the forecasting of tornadoes, hurricanes and floods.

E.P.A concentrates on the role C.F.C's play in climate warming, whilst N.A.S.A designs and launches the satellites that monitor the chemistry at various altitudes, longitudes and latitudes. If small countries are to mount a truly systematic approach to understand how industrial activities induce such changes, a strong international research programme is needed. U.UNEP should establish a coordination centre to disseminate information on climatic changes.

This coordination centre could supply and disseminate information received from the international Geosphere - Biosphere Programme.

In countries where National Academies of science exist, the International Council of Scientific Unions should admit to its General Assembly representatives of these nations who will act as spokesmen for non-represented small nations.

7. In this 1988 World Environment Day message, Dr. Mostafa Tolba, Executive Director of UNEP warned that "it may take another 15 years before scientists can give reliable predictance of what warming will mean in each region. But by then it may be too late to act."

8. He called on political and industrial leaders to cooperate with one another and with climate scientists to finance more international research and coordination that will produce more information more quickly.

UNEP and the World Meteorological organisation had established an Intergovernmental Panel and climate change to address the vastly more difficult problem of greenhouse warming by assessing the sciences, impacts and policy implications of that topic. The International geosphere - Biosphere Programme has already established 5 Priority areas under which research could be grouped, coordinated and defined. These are:

- (a) terrestrial biosphere atmosphere interaction.
- (b) marine biosphere-atmosphere interaction.
- (c) biospheric aspects of the hydrological cycle
- (d) effects of climate change on terrestrial ecosystems
- (e) global analysis, modeling and interpretation.

A network of geosphere - biosphere observations in selected ecosystems is envisioned to serve as regional research and training centres.

The remote sensing from spacecraft together with the communications and computation capability, now available have enabled the E.O.S. (Earth observing System) to list its research priorities as follows:

- (a) To develop models between climate and terrestrial ecosystems.
- (b) To monitor movement of trace gases in terrestrial ecosystems, the atmosphere and the oceans.
- (c) To observe biogeochemical dynamics of the oceans.
- (d) To construct models of earth history in past climatic changes.
- (e) To assess human interaction with global change.

It is clear from these efforts that small states must have an international institutional frame work capable of addressing issues that cut across disciplines and intermingle science and policy. This frame work must gain the support of nations with conflicting ideologies and in various states of socio-economic development.

One major challenge of the small states prevent here is to ensure the full involvement of all in the I.G.B.P. It would be tragic if the use of high technology in space sensors, communications and computers precluded the participation of our scientists because we have not provided for their training. The global policy issues

that must be resolved in the years to come will require the support of every nation. The most effective way to ensure this support is to make specific provisions for the training of adequate personnel. In this way, each nation will realise the necessity of and work towards a convergence of international interests and aspirations. The coming decade will be one of the more critical periods in the several million years of mankind's evolution. If humans are to survive safely the changes that clearly lie ahead, each day must be marked by some progress towards a better world. Let us as small nations "affirm a robust faith in the destiny of man" AS PIERRE TEILHARD DE CHARDIN wrote in his Book "Building The Earth."

