

## Oration 11: 2007 K.R. Narayanan Oration

Message from the President  
of the Republic of India



I am happy to know that The Australian National University, Canberra, has been organising an annual K.R. Narayanan Oration by eminent Indian personalities. The theme of this year's oration 'Coping with Climate Change: Is Development in India and the World Sustainable?' is indeed topical.

Climate change is a global challenge with strong economic, environmental and social dimensions. Both the developed and developing countries have to act in accordance with a common but differentiated responsibilities and capabilities. In order for developing countries to address climate change, access to appropriate technology is a key requirement. Collaborative research between institutions of developing and developed countries is the need of the hour. Institutions such as the Asia-Pacific Partnership on Climate and Clean Development, of which both India and Australia are members, are useful in this context though they are not a substitute for the Kyoto Protocol.

India is a signatory to the Kyoto Protocol and has been undertaking measures to reduce greenhouse gas emissions. While the government cannot compromise on the commitment for economic and industrial development of the country, it remains committed to addressing issues relating to our environment. Several measures have been taken by the government to reduce pollution, including emission of greenhouse gases.

I wish to take this opportunity to convey my greetings to the people of Australia, particularly the staff and students of The Australian National University. I also thank all those associated with the oration and wish the event every success.

Pratibha Patil  
New Delhi  
8 August 2007

# **Coping with Climate Change: Is Development in India and the World Sustainable?**

R.K. Pachauri

I feel deeply privileged at being asked to deliver the 11th K.R. Narayanan Oration. For me this is also a significant moment personally, because I had the privilege of knowing Shri K.R. Narayanan very well. I met him first when he was minister of state for science and technology in the Narasimha Rao government in 1986. He was again a member of parliament, when, in 1992, The Energy and Resources Institute (TERI) was asked to develop the Indian segment of the Rockefeller Foundation supported program on Leadership for Environment and Development (LEAD). I asked Shri Narayanan to become a member of the steering committee of the program in India and he readily agreed. I kept in touch with him both when he was vice-president and then later president of the Republic. It was a unique honour for me to receive the Padma Bhushan from him, and I shall never forget the joy and pride on his face and his words on the occasion when he said 'it is a special pleasure for me to pin this recognition on your chest'. He was truly one of the most shining models of humane, erudite and dignified leadership that our country has seen, and I feel this oration is a fitting tribute to his memory.

The theme of my talk today I hope reflects not only Mr Narayanan's dedication to social causes and the protection of the environment, but something that is of critical importance to the future of India and the world in view of new knowledge that has now become available, and on which awareness has grown dramatically.

The concept of sustainable development was really enunciated and popularised through the report of the Brundtland Commission, and it is appropriate that we are focusing today on a report that was released 20 years ago. However, the importance of sustainability in development policies and practice has not been realised until recently. As is often the case, it is only the occurrence or the threat of a crisis that spurs human society to unusual actions and changes in pathways. In the case of sustainable development, I think the wake-up call has really come from the sudden growth in awareness and understanding of the scientific realities of climate change. I feel privileged to acknowledge that much of what is happening today is the result of the findings of the three working groups of the Intergovernmental Panel on Climate Change (IPCC). But some of the issues that are generic to all aspects of sustainable development and the reality of climate change really go back in time, since industrialisation began. For well over a century, human society derived growing satisfaction and, in some sense, exhibited a state of euphoria from the availability of a multitude of goods and services that industrialisation and its spread provided to different countries and communities.

It was only some 50 years ago that concerns about the unfettered advance of industrialisation and all that it brought, particularly in the nature of environmental damage, received attention, and it was felt that the implications of unregulated growth needed careful reappraisal. The clarion call perhaps was sounded first by Rachel Carson who published her pioneering book *Silent Spring* in 1964. This courageous lady withstood various personal attacks and the might of the powerful chemical industry in the US while highlighting the dangers of unlimited use of pesticides for a variety of purposes. She was essentially emphasising the need to evaluate externalities that were created by industrial processes and from specific products and their use, which, while providing benefits in one sense, could cause enormous harm to society in several other respects. Incidentally, this year, 2007, happens to be centenary of Rachel Carson's birth, but I am not too sure whether we have honoured the memory of this great pioneer in this period adequately. A country like India needs to learn from her example and ensure that we do not emulate the excessive use of chemicals and pesticides that were prevalent in developed countries 50 years ago.

The next stage of concern underlying sustainability issues related to development was attained when the Club of Rome published their influential study *Limits to Growth* in 1972. It is noteworthy that this

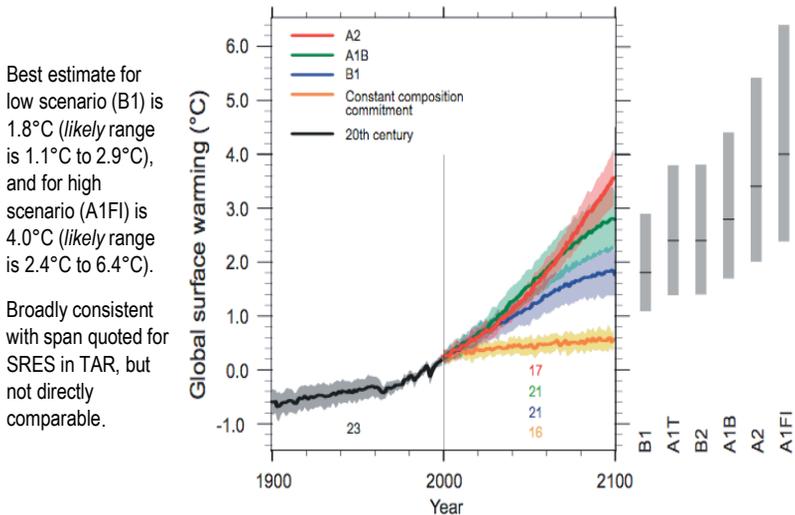
particular report sold 30 million copies in more than 30 translations. This has undoubtedly become the largest selling book in this general field that the world has produced. An updated version was published on 1 June 2004, which brought in several refinements to the earlier study. The central thesis of *Limits to Growth* was based on the finite nature of several natural resources that the world had become accustomed to using on a large scale. The Club of Rome cautioned the world against the belief that these resources could be exploited and used at increasing levels without the danger of some discontinuity and disruption in the future. Significantly, the first oil price shock took place in 1973, which led to sudden concerns about the finiteness of oil on which the world had become increasingly dependent and about issues of energy security, a subject that haunts us perhaps to a much greater degree today. *Limits to Growth* also emphasised the problem of environmental pollution, but, in most of the material presented, the book focused on environmental quality at the local level. The world had to wait another 15 years before concerns about human induced climate change received due attention. This is when the IPCC was established and undertook the task of assessing all aspects of climate change by mobilising the best scientific talent and relevant expertise from across the globe.

Today, I would like to present some major findings from the Fourth Assessment Report (AR4) of the IPCC contained in the contributions of the three working groups whose reports have been approved by the panel. In November, we hope to complete the Synthesis Report, which will provide a synthesised assessment of the major findings of the three working groups and form a relevant basis for policymaking and agreements in this area. A major finding of the Working Group I Report was:

Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level.

Several other pieces of knowledge have been revealed in the three reports based on the advancement of scientific understanding and knowledge that has taken place since the Third Assessment Report (TAR) was brought out in 2001. First, 'most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations'. This contrasts significantly with the findings of the TAR, which considered it 'likely' that

the climate system had changed because of human actions. The change in these qualifying terms represents a substantially higher level of probability attached to this finding in the AR4. Future projections of climate change are shown in Figure 1.



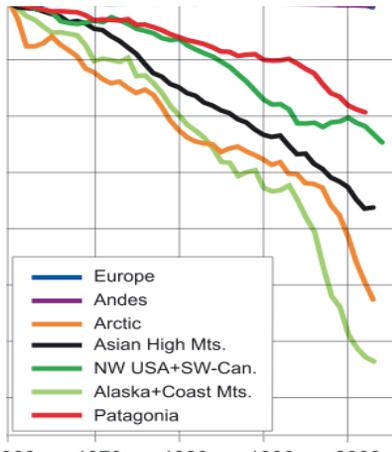
**Figure 1: Projections of future changes in climate**

The AR4 has also advanced our understanding of the impacts of climate change on which we now have much greater regional detail as well as desegregation of sector-wise and ecosystem-wise impacts. Some of these impacts are not merely significant in terms of their threat to species but would clearly have unfavourable effects on economic activities as well.

India, for example, is vulnerable to the impacts of climate change to a substantial degree. One major observation of concern relates to the melting of the Himalayan glaciers. This, of course, is a worldwide problem, but an issue of considerable significance to Indian society, since the large population located in the northern part of the subcontinent relies on water from rivers originating from Himalayan glaciers. The change in glacier mass balance across the globe is shown in Figure 2, wherein the decline in the Asian High Mountain region mass balance as shown is significant.

Cumulative loss of glacier mass in many regions.

During the 20th century, glaciers and ice caps have experienced widespread mass losses and have contributed to sea level rise.



**Figure 2: Glacier mass balance**

Any reduction in the flow of rivers in northern India will not only reduce water supply for irrigation and other purposes, but would also adversely affect recharge of groundwater in the region. The economic implications of these could be serious. The IPCC AR4 has also brought out the fact that annual precipitation in lower latitudes including parts of South Asia has been declining, and is likely to decline in the future as well. Yet, at the same time, extreme precipitation events are likely to increase in frequency and intensity. Overall, India would see more frequent floods as well as droughts. This would affect agriculture adversely. But the more serious effects on agriculture are already evident in the decline of yields of crops such as wheat and rice, resulting from an increase in temperature, particularly during certain periods of the crop cycle. It is estimated that a 0.50°C rise in winter temperatures can reduce the yield of wheat by 0.45 tonnes per hectare against an average yield of 2.6 tonnes per hectare currently.

This would have serious implications for food security in India and the ability of the country to ensure adequate nutrition for a growing population. No doubt adaptation would be a critical part of response strategies to climate change in India, but given the existence of 300 million people who are undernourished today, the magnitude of the threat of hunger is likely to grow in the future. While agriculture contributes less than 30 per cent of GDP in the country, it affects the lives and livelihoods of a very large number of people, most critically those who are involved in

rained agriculture. Nearly two-thirds of the area of land under agriculture is still rainfed. The scarcity of water that is likely to grow would affect not only agriculture, but also industry, household consumption and other areas. The gross per capita water availability in the country is projected to decline from 1,820 cubic metres per year in 2001 to 1,140 cubic metres per year in 2050. India, therefore, has to bring about a major transformation in its management of water resources.

The challenge of supplying enough food for India's growing population is becoming more difficult because the global food scenario does not look bright. Global food stocks in recent years have shown a substantial decline, with no prospects for improvement in view of growing demand for food grains worldwide and stagnation in productivity of major crops. There are over 850 million people in the world who do not have enough nutrition. As many as 54 nations do not produce enough to feed their people and, against the prospect of growing food prices in the global market, their economic prospects would also suffer. India would be no exception to this possibility.

The nature and intensity of the impacts of climate change for different levels of temperature increase are shown for specific sectors and ecosystems in Figure 3.

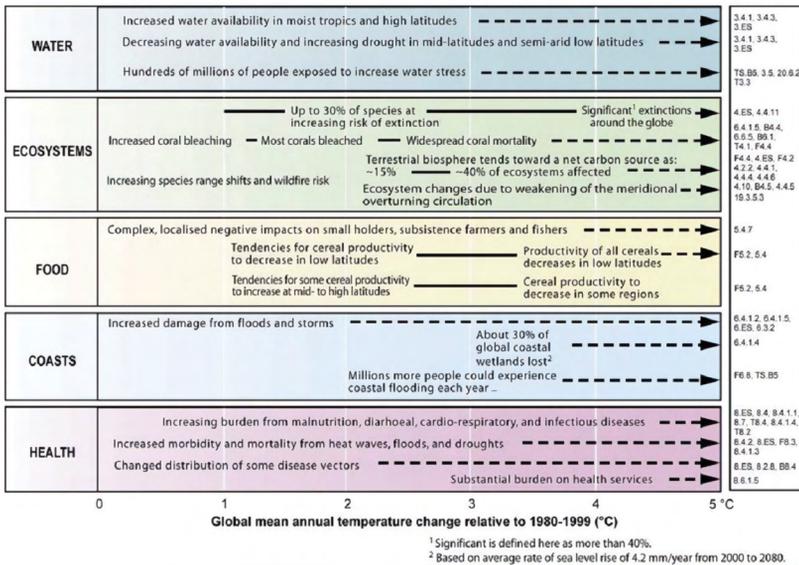


Figure 3: Global mean annual temperature change

One of the most serious aspects of climate change is the equity dimensions of the problem. The largest responsibility for the increase in concentration of greenhouse gases (GHGs) in the atmosphere lies with developed countries, but the worst impacts and the highest vulnerability applies to several developing countries. The Asian megadeltas, which include cities such as Dhaka, Kolkata and Shanghai, would be some of most vulnerable spots against the projections of rising sea levels, with prospects of coastal flooding and other serious consequences that would affect large numbers of people and property. It is entirely possible that some of the prosperous cities in Asia would suffer seriously from the human and economic consequences of extreme events that would have a major impact. With the growing vulnerability of these habitats, economic loss and human misery would increase. The city of Mumbai within a span of two years has suffered two incidents of heavy precipitation descending in a short period of a few hours on each occasion, the economic consequences of which are being felt now and are likely to continue for several years.

Under the UN Framework Convention on Climate Change (UNFCCC), negotiations are currently in hand for a new agreement beyond 2012. Not only is it urgent for the world to reduce emissions of GHGs adequately to stabilise the Earth's atmosphere and climate system, but also essential is the need to address the equity aspects of this threatening problem. The international community has provided hardly any resources for adaptation measures in the most vulnerable countries, such as small island developing states where the very survival of human beings is at stake. A country like India, therefore, has not only to raise its voice on the inequitable nature of actions and responses to climate change between developed and developing countries, but also ensure that in its own path of development it pursues the objectives of sustainability. The co-benefits of such an approach are so overwhelming that, even in the absence of climate change, they would be justified for reasons of energy security, reduced local pollution and, in several respects, the creation of new employment.

The problem of climate change, therefore, provides a unique moment of opportunity when a large developing country such as India can show exemplary resolve to follow a path distinctly different from that adopted by the world's developed nations. By doing so, India would not only serve its own people well but also, and at the same time, create a powerful model for the rest of the world to emulate, which is clearly the most

compelling way of ensuring that human society gets off the unsustainable path of increased GHG emissions and heightened levels of climate change in the future.

It was on Earth Day in 1995 that TERI launched a major project called GREEN India 2047. This was in response to a desire within the institute to attempt something of value to celebrate 50 years of independence. After considerable discussion and debate, it was decided that the institute should carry out a study to assess the damage and degradation that had occurred in India's natural resources and the environment during the first 50 years of independence, which was to end on 15 August 1997. On the eve of Independence Day 1997, the results of this major study were released and a presentation made before the then Prime Minister of India Mr I.K. Gujral and several of his colleagues in the Council of Ministers.

Several of the findings of that assessment were of deep concern and, as Mr Gujral said on the occasion, these should 'jolt us into action'. It was found, for instance, that over 10 per cent of the country's economic output was being reduced on account of damage and degradation in the country's environment and natural resources. Between 11 and 26 per cent of agricultural output was being lost on account of soil degradation. It was also estimated that approximately 2.5 million people were dying annually on account of air pollution, of which indoor air pollution was the largest cause. Updates have been carried out of the original study including one that was completed in 2006, wherein several changes were documented, some of which were in the right direction and others were actually accentuating existing problems. Ongoing analysis also indicates that, particularly in rural India, the poor are far more dependent on common property resources than urban communities. Consequently, the depletion or degradation of natural resources leads to hardship and deprivation for the poorest sections of society. India is a large and diverse country and disparities of income are significant and widening. In the case of agriculture, the largest numbers of farmers are those that are essentially engaged in subsistence farming. Any reduction in the availability of natural resources or rainfall, therefore, affects the lives and livelihoods of this section of society directly. The GREEN India 2047 study was not merely an effort to present a doomsday scenario, which clearly emerged in the business as usual projections that were developed for the year 2047. The project also attempted to provide answers and solutions to the current dilemma of achieving high rates of economic growth while also rejuvenating the country's natural resources, the quality of which had been degraded over the years.

The popular approach in developing countries is to emphasise that their governments cannot and will not accept any targets or commitments to limit emissions of GHGs. The overlap between mitigation measures for improving local environmental quality and managing emissions of GHGs is so large that several actions need to be taken for domestic rather than global considerations. Consequently, the time has come to identify so-called ‘no regrets’ measures that would help to address local environmental problems primarily, and would also produce large global benefits, by which India can justly claim that it is undertaking its share of the ‘common but differentiated responsibility’ that is defined in the UNFCCC. Overall, the world has to implement reduction of emissions with some sense of urgency. Table 1 shows the period within which a peaking of emissions should be attained for different levels of concentration of GHGs. Beyond the peak, a decline in emissions becomes essential. And the cost of action is dwarfed by the consequential costs of inaction. For the stabilisation level shown in the first row of this table, the total cost globally in 2030 will not exceed 3 per cent of global GDP.

**Table 1: Long-term mitigation (after 2030)**

Stab level (ppm CO <sub>2</sub> -eq)	Global mean temp. increase at equilibrium	Year CO <sub>2</sub> needs to peak	Year CO <sub>2</sub> emissions back at 2000 level	Reduction in 2050 CO <sub>2</sub> emissions compared to 2000
445–490	2.0–2.4	2000–15	2000–30	–85 to –50
490–535	2.4–2.8	2000–20	2000–40	–60 to –30
535–590	2.8–3.2	2010–30	2020–60	–30 to +5
590–710	3.2–4.0	2020–60	2050–2100	+10 to +60
710–855	4.0–4.9	2050–80		+25 to +85
855–1130	4.9–6.1	2060–90		+90 to +140

Overall, it is time that India defines a totally new path of development that ensures efficient use of natural resources and a shrinking footprint on the ecosystems of this planet. The importance of this reality is being realised increasingly by the Indian people and government. It is no surprise, therefore, that, as revealed in a recent survey, 60 per cent of the country’s population is concerned about climate change — a concern that ranks second only to the fear of terrorism. Similarly, it is an indication of the increased attention that the Government of India is providing to this problem that the prime minister has set up an Advisory Council on

Climate Change, chaired by him and with members from the Union Council of Ministers as well as representatives and experts from outside the government.

Given the rapid growth of the Indian economy, urgent shifts towards a sustainable path of development are essential. Otherwise, investments and infrastructure would be created that would use natural resources unsustainably, to the detriment of coming generations and leading to a stage where the economy itself would suffer adversely. What is good for India would also be good for the world, and it is in realisation of this fact that India has to emerge as a model that other nations would like to emulate. By establishing a benchmark, India would also gain economic advantage, since the processes, technologies and products that it develops for attaining a sustainable path of development would provide a competitive advantage that would open markets globally for Indian suppliers who would access opportunities overseas. It is appropriate to recall Gandhiji's famous words 'Be the change that you want to see in the world'.

While I have the privilege of delivering this talk in Australia, may I also say that the global community and posterity demands that Australia also seize this opportunity for reassessing its position and act resolutely on the basis of scientific evidence and actual observations to chart a new path of development. Indeed, Australia can be a major example for other developed countries and particularly for its neighbours in Asia, which are at various stages of development towards economic prosperity and growing rapidly. A shared vision in this respect between India and Australia can have much greater global appeal and potential than if the two countries act in this regard entirely on their own. I would, therefore, plead for a closer relationship of development issues with a sense of urgency. A churning of conventional thinking and reappraisal of past practices and policies is essential.

Shri K.R. Narayanan, at the major summit organised by TERI in 2000, pointed out the perils of 'voluptuous consumption' that the world was pursuing and advised participants to see the merit of Gandhian principles in which lie abounding benefits to the human race. If India were to seriously alter its path of development and create a new model of sustainability, then that would be an appropriate tribute to the memory of Shri K.R. Narayanan and a timely acceptance of Gandhian thought.

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