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EDITORIAL

ELUDING NATURE'S WRATH

NATURE'S WRATH is inescapable. It does not discriminate between rich and poor, between foreign tourists in a seaside villa or local fishermen on the coast. Death by natural disasters is as old as recorded history– from the typhus epidemic in Athens in 430 BC to the Shaanxi earthquake of 1556 in China, and closer home, the Bangladesh famine of 1974 and the latest tsunami that hit South-East Asia on December 26, 2004. Even as the death toll continues to rise, it is estimated that the magnitude will surpass the number of people that were killed in Hiroshima, which was estimated to be 1,40,000. The difference between the two is of course, that one is natural and the other man-made, and while there is scope of preventing man-made disasters, nothing can be done to control natural disasters.

The frequency of natural disasters is on the rise and as increasingly been having a more severe impact on the world in terms of human and economic cost. The reasons of increasing natural disasters, according to experts, are environmental degradation, climate change, population growth especially in cities etc. While the number of lives lost has declined in the past 20 years, the number of people affected has risen. Thus, 8,00,000 people died from natural disasters in the 1990s compared with 2 million in the 1970s. However, the number of people affected by natural disasters has tripled to 2 billion in the last decade. Ironically the economic losses increase as the world becomes richer and more developed. The International Red Cross Society published an annual World Disasters Report in which it was reported that in the past two decades direct economic losses from natural disasters has multiplied five-fold to US$ 629 billion. In 2003 alone there were about 700 natural disasters which killed about 75,000 people and caused about US$ 65 billion damage. In the last decade in India, more than four thousand people died and about 3 crore people were affected by disasters annually.

Natural disasters are uncontrollable, but the devastation which follows any natural disaster is not. Disasters are closely linked to poverty as they can wipe out decades of development in a matter of hours. "Disasters are first and foremost a major threat to development and specifically to the development of the poorest and most marginalized people in the world.... and ensure they stay poor", says Didier Cherpital, the former Secretary General of the International Federation of Red Cross and Red Crescent Societies. More than 95 percent of all deaths caused by disasters occur in developing countries; and losses due to natural disasters are 20 times greater (as a percent of GDP) in developing countries than in industrial countries.

Natural disasters hit poor people the hardest, and therefore, implementing effective disaster recovery programs may be an effective means of reducing poverty. The message spread by the Worlds Bank's Hazard Management Unit, which is working with developing countries, is to plan for potential natural hazards as a developmental issue, instead of confronting them only as a humanitarian emergency when a crisis strikes. At the national level, disaster prevention needs to be an integral part of a country's development plans. It is to be commended that the Indian government, under the aegis of the Ministry of Home Affairs, has included disaster management in its development programme in the Tenth plan.

After the tsunami disaster, installation of an expensive (about US$ 20 million) tsunami warning system in the Indian Ocean has been on the card. Since a lot of the countries on the coastline of the Indian Ocean are developing nations, what is arguably more important than a hi-tech early warning system, is an improved communication system. American scientists monitoring the Pacific had allegedly over an hour's notice of the earthquake that triggered the tsunami in the Indian Ocean, but they did not know whom to contact in these South-East Asian countries. As such, installing high-tech instruments would be fruitless unless all countries in the region have an improved communication infrastructure in place. A tsunami-alert system is a combination of real-time sensors, data-

crunching computers and orbiting satellites, but more importantly it requires imparting training to the public and officials on how to respond to warnings. The Department of Science and Technology of the Government of India has admitted its mistake in ignoring the underwater seismic tremors near Indonesia on the grounds that the tsunami is uncommon in the Indian Ocean – however, such a costly mistake cannot be allowed to repeat.

In India, about 60% of the landmass is earthquake prone, over 40 million hectares are prone to floods, 8% of the total area is prone to cyclones and 68% of the area is susceptible to draught. It therefore requires taking appropriate steps to lessen the impact of nature's fury. Preventive measures and preparedness are the two basic components which can make a significnat difference when it comes to protecting our development from nautral hazards. Developed countries have been able to reduce human and economic losses with adequate safety measures and a better response system in the aftermath of any natural tragedy. Indian and State governments are now considering the amendment of building rules in areas more prone to earthquakes. While developed countries use established insurance mechanism to reduce property losses, developing countries like India divert funds from development programmes to emergency relief and recovery.

Even without the tsunami, what India lacks is the appropriate training of personnel, awareness and maintenance of emergency equipment. It has happened innumerably that when a fire breaks out in a building, the water resource meant for fighting the fire is found to be dry, or the emergency gate meant for entry of fire-engines and other emergency services is blocked by a heap of garbage and waste disposals. How many of us in our offices know to use the simple firefighting equipments which "decorate" our offices and buildings ? While developed countries routinely and religiously check all emergency systems periodically, in India they are ignored until a mishap occurs. The pattern is only too predictable – after every mishap, the inquiry committee inevitably points out the lack of proper training or negligence of duty.

Tsunami is a Japanese term, meaning 'harbour wave'. A tsunami can be generated by any disturbance that displaces a large mass of water from its equilibirum position. Earthquakes, landslides, volcanic eruptions, explosions, and even the impact of cosmic bodies, such as meteorites, can generate tsunamis. A tsunami travels at a speed that is related to the water depth-hence, as the water depth decreases, the tsunami slows. The tsunami's energy flux, which is dependent on both its wave speed and wave height, remains nearly constant. Consequently, as the tsunami's speed diminishes as it travels into shallower water, its height grows. Because of this, a tsunami imperceptible at the middle of the sea may grow to be several meters or more in height near the coast. When it finally reaches the coast, a tsunami may appear as a rapidly rising or falling tide, a series of breaking waves. The word tsunami, which was relatively obscure and unknown in this part of the world even a month ago, has now become part and parcel of our vocabulary and has created interest on its formation and destructive powers. With this in mind, we have included a general article on tsunami in this issue which I am sure will satisfy some of your curiosities and generate more.

More importantly, a natural disaster of this magnitude serves to remind us about the mortality and frailty of Man. Our ego and pride in our intelligence often blind us to the relative insignificance of Man in the grand design of the universe, and we are led to believe, that the world revolves around our interests and greed. We will have learnt our lesson if we can set aside our petty differences of language, religion and political beliefs and try to live together with mutual respect and tolerance. Indeed, the huge outpouring of grief and help, both monetary and services, testifies to the innate goodness in Man and we hope it does not require another tragedy to bring out this spirit. While our hearts go out to the families of the innocent victims, we also pledge at the same time that as scientists, our duties will not cease with donations and relief work but to remain in constant alert to avoid repeating mistakes.

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2005 has been declared the World Year of Physics by the United Nations, with the hope of making the excitement of physics accessible to a wider audience and to inspire a new generation of students through the efforts of a worldwide collaboration of scientific societies. Science and Culture wishes to join this celebration by publishing exciting and thought-provoking articles on physics throughout the year, and we roll this off with a reprint of a tribute to Albert Einstein, the greatest physicist of our time, by another great scientist, S. N. Bose. This is very appropriate not only because 2005 marks the 125th birth anniversary of Einstein, but because exactly one hundred years ago, three articles by this young clerk in the Bern patent office shook the foundations of physics and changed the way scientists looked at time and matter. By presenting ground-breaking ideas in three diverse fields– the special theory of relativity and mass-energy equivalence, quantum theory and the dual nature of light, and statistical mechanics in the context of the theory of Brownian motion–Albert Einstein announced to the world that he had arrived. ❐

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