

New alarm bells ringing

Md. ASADULLAH KHAN

THE anniversary of World Environment Day, in recent years is being marked by environmentalists in both rich and poor countries with no exuberance but new alarm about common global peril. The dire warning notes are that rapid industrialisation is devastating fragile natural resources and undermining the health and well-being of growing numbers of people. Urban air pollution in poor and underdeveloped countries is among the highest ever recorded, averaging 10 times World Health Organization (WHO) standards. Suspended particles, mainly from automobile exhaust remain a major problem as the number of vehicles balloon. In Dhaka, the world's one of the most polluted cities, vehicle emissions account for 70 percent of the filth. These pollution phenomena have enhanced global warming caused by the continued buildup of CO₂ (carbon dioxide) and the other so called greenhouse gases. The effect of CO₂ in the atmosphere is comparable to the glass of a green house: it lets the warming rays of the sun in but keeps excess heat from radiating back into space.

Mentionably the Earth's climate is driven by a continuous flow of energy from the sun. This energy arrives mainly in the form of visible light. About 30 per cent is immediately scattered back into space, but most of the 70 per cent which is absorbed passes down through the atmosphere to warm the earth's surface. And the earth must send this energy back into space in the form of infrared radiation. But green house gases, namely carbon dioxide, water vapour, ozone, methane, nitrous oxide and the chlorofluorocarbons (CFCs) block infrared radiation from escaping directly from the surface to space. Consequently, average global surface temperatures have increased by

0.3-0.6C in the last 40 years.

Other than these environmental hazards, floods, droughts, hurricanes, or cyclones are all the bizarre weather extremes we've been having lately in the planet's atmospheric systems. Environmentalists in most of the countries have highlighted the link between environmental problems and weakening economic and social structures in a growing number of nations.

The world commission on Forests and Sustainable Development reported that in the past 20 years alone, forests have disappeared in 25 countries and another 18 have lost more than 95 percent of their tree cover. Just before World War II, there were an estimated 60 billion hectares of forest, now there are only 3.6 billion globally. The causes are: logging, indiscriminate cutting for fire wood, brick kiln and desertification. The Switzerland-based World Conservation Union said that such forest decline threatens 12.5 percent of the world's 2,70,000 species of plants and 75 percent of mammals. It was further reported by the International Organisation for Migration that the number of environmental refugees -- those who fled their homes because of depletion of natural resources -- was now at a record high of 25 million, mostly in Africa, Asia and parts of Eastern Europe. On the other hand it has been revealed from the United Nations sources that between 1990 and 1999, the number of people infected with HIV/AIDS grew five-fold, from 9.8 million to 47 million. And in this period, disappointingly, global spending on AIDS research and prevention merely doubled to \$350 million. Mentionably, the HIV/AIDS virus is frequently borne by environmental and other refugees.

More worrisome, the U.S. Census Bureau revealed in the early part of 2000, that the world's population currently nearly 6 billion, will

climb to 8 billion in the next 25 years. By 2050, there will be almost 10 billion people in the world. UN's chief demographer in the current period pointed out that in 1950, Europe's population was three times that of Africa. To-day Africa's population of almost 1 billion is nearly three times that of Europe. Such growth, said the chief demographer was simply beyond the carrying capacity of an already beleaguered continent.

The greatest onslaught to world environment has come through the nation's failed efforts to provide the most basic of provisions to poor

ment programme and the World Resources Institute in a joint project named Pilot Analysis of Global Ecosystems (PAGE) revealed in their report in the last part of 2000 the stunning scale and character of human impact on the planet. The report reveals the degree to which agricultural lands have been degraded around the world by the buildup of salts and the loss of nutrients. The report also locates oceanic dead zones caused by pollutants flowing to the sea from rivers. It further shows the degree to which productive parts of the sea floor have been destroyed by trawl-

ing as well as damage of the coastlines by human beings. Many of the statistics are staggering: half the world's wetlands have been lost in the past century, 58 per cent of the coral reefs are imperiled by human activity, 80 per cent of grasslands are suffering from soil degradation, 20 per cent of dry lands are in danger of becoming desert and ground water is being depleted everywhere.

PAGE analysis looks at the natural world in a new way, not just as a beautiful place that should be preserved for aesthetic or moral reasons but also as an economic asset that delivers irreplaceable goods and services. Ecosystems temper climate, purify and store water, recycle wastes, produce food and support all the other things that make Earth a friendly oasis in a stark and lonely universe.

The stark finding from PAGE analysis is that our planet's capacity is beginning to diminish, threatening

into farms and industrial parks, diverted and despoiled their rivers and re-engineered their coasts. But sure enough, the damage has been wrought in various ways much beyond their knowledge. As for sea-resources that are on the decline, the reason can be attributed to use of fishing fleets that are 40 per cent larger than the ocean can sustain. At that rate more fisheries are bound to collapse as did North Atlantic Cod grounds. On the other hand, shrimp-farmers cut mangroves in many places like Thailand, Ecuador, the Sunderbans in Bangladesh and on other tropical coast lines, unaware that their increased production comes at the expense of offshore fishermen who catch fish nurtured in mangroves. That means we are borrowing heavily from our children's future.

Studies have revealed that since 1970 global food output has doubled and livestock production tripled

but the trade offs have been depleted. Around the world we have Polluted water supplies, exhausted soils and destroyed habitats. Since humans already use more than half the available fresh water and two thirds of all agricultural lands is damaged to some degree, we face an enormous challenge merely to feed the 1.5 billion to 2 billion people expected to join the global population within the next two decades.

Despite vast improvements in tracking information through satellite images and computer models, there are yawning information gaps

and the biggest gap in information concerns freshwater and coastal/marine ecosystems which are in the worst shape and without contradiction the most vital for human well-being. It is difficult enough to assess an ecosystem especially by the common run of people having no schooling in environmental phenomenon but policy makers need to understand how various ecosystems interact. Deforestation in mountains can worsen floods in grasslands or agricultural lands below, as was the case in China, Madagascar and Mozambique. In the home front, mountain cutting in Chittagong, logging in the forests of Chittagong, Sylhet, Mymensingh and most notably in the mangrove forest of the Sunderbans have had serious impact on weather patterns in the country, upsetting monsoon periods, causing drought like situation and flooding at times. Rain running off deforested hills in the northern part has badly eroded the soil and low-lying areas are flooded much of the time.

One consequence is certain to be continued pressure on woodlands, especially tropical forests or natural forests that are the reservoirs of the majority of the earth's animal and plant species. Some studies indicate that between 1980 and 1990, an estimated 8 per cent of the world's tropical forest-cover was cut, burned or otherwise destroyed. The loss of such irreplaceable biological treasures from Bangladesh to Indonesia to Brazil to Amazon that are yet to be catalogued is disturbing in its own right, but the impact of deforestation goes far beyond the felled trees. As a region loses its forests, it loses its ability to trap and absorb water, and so run off from denuded woodland worsens the natural process of soil erosion. If at the same time, farmers harvest crops year after year, the soil is constantly exposed to wind and water. Result: the world wears away 24 billion tons of topsoil a year.

With about 3.5 million people surrounding the Sunderbans in Bangladesh trying to exploit resources of this forest year after year without allowing time for replenishment, it is now reduced to half the original area of 10,000 sq. km. Water ways and canals in the Sunderbans, once the richest and plentiful resources of fish nurseries in the South-east Asia has been exhausted because of over-exploitation. Other than this the continued use of 1,00,00 - 1,20,000 cubic metres of geva trees annually for the Khulna Newsprint Mills since its establishment in 1959 has put serious stress on the sustainability or survival of this mangrove ecosystem. Experts opine that sustainable yields for the Sunderbans could at least be 50,000 cubic metres geva wood annually. The atmospheric scientist's prediction of impending doom in the form of climatic disruption, drought, floods, hurricanes, sea level rise and a gradual rise in world wide temperatures because of global warming in consequence of rising greenhouse gas levels, mostly man-made gases trapping too much heat from the sun has come to be true. This climate change is likely to have significant impact on global environment.

In general, the faster the climate changes, the greater will be the risk of damage. The mean sea level is expected to rise by 15 to 95 cm by the year 2100, causing flooding in low lying areas and other damage. Climatic zones (and thus ecosystems and agricultural zones) could shift towards the poles by 150 - 550 km in the mid latitude regions. Forests, deserts, rangelands and other unmanaged ecosystems would face new climatic stresses. As a result many will decline and fragment and individual species will be extinct.

In the backdrop of the U.N. sponsored Earth Day Meet in Bali, Indonesia this year ending in a fiasco because of the wealthy nations' dilly-dallying or rather reluctance to commit funds to save the deteriorating environment, dangers seem to engulf us at a fast pace. Indeed it is time that policy makers and world leaders look well beyond the borders of their countries, make environment a core policy objective and provide leadership and support to put all nations on a cleaner and more sustainable path to prosperity.

As the former US president Bill Clinton said, "As the world's largest emitter of green house gases, the U.S. has a special responsibility to lead the effort against the threat of global warming". We must understand that the heat trapping gases warming the earth pose the same risk to all, be it, whether he comes from the U.S., China, or India or Bangladesh. In such a quandary, our best hope may be that even where the governments lag, their people understand both the stakes and the urgent need for action.

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Oases on the ocean floor

EMMA DUNCAN

A geyser spewing poisonous, super-hot water into the sunless and otherwise chilly depths of the ocean seems an unlikely place to find life. But in fact such geysers -- or deep-sea hydrothermal vents -- are the most densely inhabited areas of the entire deep-sea floor.

Located hundreds of metres below the ocean surface, deep-sea hydrothermal vents form as a result of volcanic activity on the ocean floor. Water seeps through cracks in the Earth's crust, dissolving metals and minerals as it becomes superheated from nearby magma. This water -- which can reach temperatures of 400°C -- eventually rises back through the ocean floor, erupting as a geyser from a hydrothermal vent. The dissolved minerals and metals precipitate on contact with the cold sea water, forming a chimney around the vent.

Although not discovered until 1977, scientists had long suspected their existence. But no one ever dreamed that deep-sea hydrothermal vents would support thriving communities that include blind shrimp, white crabs, giant tubeworms, clams, shell-less snails,

Discovered only 25 years ago, the unique inhabitants of deep-sea hydrothermal vents have revolutionised biology, widening our understanding of the extreme conditions in which organisms can survive and providing clues to the origins of life itself. The Azores government recently declared two vent fields in the North-East Atlantic Ocean as Marine Protected Areas -- an important step towards the conservation of these fragile ecosystems about which much is still unknown.

anemones, and fish. These rare geological features turned out to be veritable oases in the deep sea, with a biomass equivalent to that of a rainforest.

At first glance, the animals inhabiting deep-sea hydrothermal vents may seem not so dissimilar to those inhabiting the rock pools and shallow seas of the world. In fact, they are unlike any other life on Earth.

Sunlight never reaches the deep ocean floor, making the harnessing of the sun's energy through photosynthesis -- the basis of most life on Earth -- impossible at these depths.

Instead of sunlight, the life that colonises the vents relies on hydrogen sulfide -- more commonly known as rotten egg gas and toxic to



Crab and mussels at Menez Gwen hydrothermal vent field.

most land-based life. Hydrogen sulfide is one of the chemicals present in the mineral-rich water pouring out of the vents. Similar to the way that plants use the sun's energy for photosynthesis, the energy created when hydrogen sulfide oxidizes can be used by some bacteria for growth, in a process called chemosynthesis. These bacteria form the bottom level of the food chain in these ecosystems, upon which all other vent animals are dependent.

The reliance on chemosynthesis instead of photosynthesis is not the only unique feature of the animals living around deep-sea hydrothermal vents. These animals survive pressures up to 200 times that on the Earth's surface, a witch's cauldron of toxic chemicals, and huge extremes of temperature. Vent microorganisms can survive temperatures of up to 113°C, the highest temperature recorded at which an organism can live. Apart from hydrogen sulfide, vent water also contains poisonous heavy metals and is more acidic than vinegar. Biologists still don't know exactly how vent animals survive in these conditions.

But survive they do. More than 300 species have so far been identified in deep-sea hydrothermal vent ecosystems, of which over 95 per cent are new to science. Many are restricted to a particular vent field, making each ecosystem unique.

Amazingly, vent life has changed little over time. A whole new domain of life was discovered in vent ecosystems -- Archaea, an ancient form of life most closely related to the first life on Earth. Other vent life also appears to be more closely related to ancient animals than to animals living closer to the ocean's surface. Indeed, vent animals on opposite sites of the globe are more closely

related to each other than to those living outside the vent ecosystem, just a few metres away. Some researchers have speculated that life began in extreme environments similar to hydrothermal vents. Others have even suggested that if these environments exist on other planets, then life might very well exist there too.

Much is still unknown about deep-sea hydrothermal vent ecosystems. But ironically, the quest to find out more is threatening these fragile areas.

The biggest danger facing most deep-sea vent ecosystems is physical damage caused by human activity. Some vents are visited multiple times each year for research purposes, which are often uncoordinated and unregulated. The possibility that vent microorganisms could be useful for cleaning up industrial pollution containing hydrogen sulfide and heavy metals, for example, makes bioprospecting very attractive. In addition, many vent chimneys are a potential bonanza of gold, silver, and copper, and maybe even oil. There is also a growing interest in deep-sea hydrothermal vents for deep-sea tourism.

Hydrothermal vents are small and each individual vent ecosystem is absolutely dependent on the unique mix of chemicals and temperatures created by the vent. Destroying vent structures through mining would completely destroy a vent ecosystem. Unregulated scientific sampling could also have devastating consequences on a vent ecosystem, through alteration of the vent habitat as well as dispersion of organisms between sites and introduction of exotic species.

Clearly, forward-thinking measures are needed to ensure the long-term protection of deep-sea hydrothermal vents before such

damage occurs. However, the deep sea is a relatively new concern to conservation. "The necessity for legal protection of deep-sea hydrothermal vents, and marine offshore environments in general, is not yet a high priority in most countries," points out Simon Cripps, Director of WWF's Endangered Seas Programme.

Canada was the first country to protect a deep-sea hydrothermal vent system. In 1998 the Endeavour Hydrothermal Vents, located 250km southwest of Vancouver Island, were designated as a Marine Protected Area. This designation provides for long-term protection of the vent ecosystem by prohibiting the removal, disturbance, damage, and destruction of anything within the protected area. The protection also includes a comprehensive management system to safeguard the vents against unregulated human activities.

This year the regional government of the Azores became the second government to demonstrate similar forward thinking. Following concerns expressed by scientists involved in biological surveys of the Lucky Strike and Menez Gwen vent fields, the Azorean government began the process of designating these two areas as Marine Protected Areas, with implementation expected to be complete in 2003. WWF will tomorrow recognise these designations as a Gift to the Earth -- the organisation's highest recognition for conservation achievement.

The Lucky Strike and Menez Gwen vent fields are located within the Portuguese Exclusive Economic Zone (EEZ) on the Mid-Atlantic Ridge, at a depth of 1700m and 850m, respectively. Their proximity to land and relatively shallow location make the sites easy to access, and both have been the subject of a number of scientific explorations.

Similar to the Endeavour Hydrothermal Vents, protection of the Lucky Strike and Menez Gwen vent fields will involve a carefully thought out management plan to ensure that further scientific research and monitoring activities are carried out in a responsible way. A workshop involving scientists, environment managers, WWF, and the Portuguese navy has been held over the past two days to come up with an effective management plan. "WWF hopes that this plan will be used as a blueprint in efforts to protect and manage similar environments elsewhere in the offshore and deep-sea environment of Europe's seas", says Stephan Lutter, Director of WWF's North-East Atlantic Programme.

The deep sea plays an important role in sustaining life on our planet. Apart from their geological and ecological importance, deep-sea hydrothermal vents regulate both the temperature and chemical balance of the world's oceans. The deep sea also absorbs greenhouse gases and maintains large-scale processes necessary for life on Earth. Proper management of human activities in the deep sea is absolutely vital. The voluntary actions of the Canadian and Azores governments in protecting these fragile ecosystems set a unique precedent and should be an example to us all.

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