

## A question of life for the lifeline

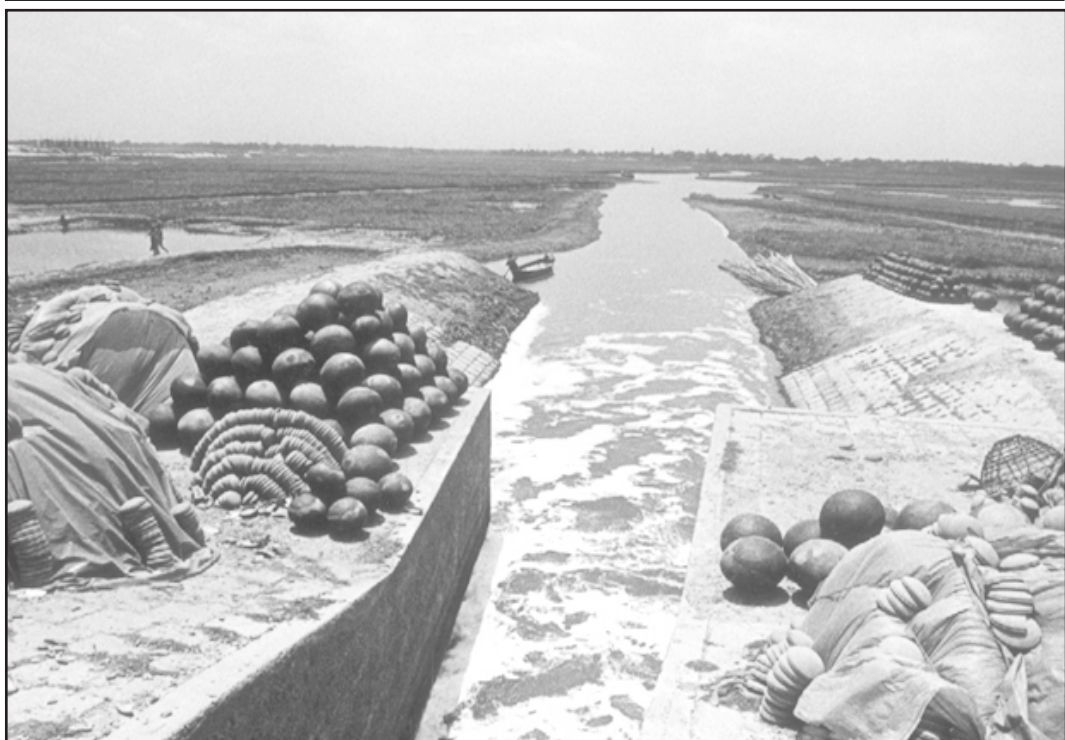
ON March 4 this year, some news dailies reported that WASA supply water in vast areas stretching from Bangshal to Lalbagh in the city has become unsuitable even for household chores, let alone drinking. Tests have confirmed that pipe-water is severely polluted. Residents of Bangshal, Nazirabazar, Kasaituli, Begumbazar, Moulavibazar, Becharam Dewry, Water Works Road, Imamganj, Posta and Rahmatganj complain that the WASA water is full of detritus and looks like coloured soup. High levels of pollution in WASA water, both in Dhaka and Chittagong, imperil not only human health and development but also aquatic and terrestrial ecosystem on which life depends. There are evidences that we now face a fast-deteriorating situation occasioned by wasteful use of water.

There is a close link between economic growth, human development and good management of the natural resource base - mainly water bodies and forests. Unfortunately, socio-economic development appears threatened by environmental degradation through polluted water and extinction of forests. Despite an overall improvement in the living standard, marked by fast-paced urbanisation, the outlook for sustainable development in such big cities as Dhaka, Chittagong, Khulna and Rajshahi is not encouraging. The gains are being offset by certain negative trends, such as the growing scarcity of fresh water and a rise in absolute numbers of desperately impoverished people.

Reports published in the dailies quoting WASA sources indicate that water of the river Buriganga has become polluted beyond redemption. Experts indicate that the present dissolved oxygen level is well below four mg per litre, minimum requirement for the survival of any species of fish and other aquatic life forms. Experts say the river receives an estimated 450,000 cubic metres of wastewater per day only through three points - Hazaribagh tanneries, Dholaikhal and the Pagla sewage treatment plant. Experts further say that wastewater discharged through these three sources consumes 40 tonnes of dissolved oxygen per day from the river water. About 33 crore cubic metre wastes are being dumped into rivers and lakes in Dhaka and its adjoining areas. In the teeming northern part of the city, filthy water in choked drains stagnates for days.

Only about one-third of the city has the luxury of an underground sewer system. In most places, it can be seen that human excreta flow directly into open surface drains that ultimately falls into the river. Even refuse dumped on the riverbank finds its way into the Buriganga during seasonal floods along with other hazardous wastes. About 200 tanneries in the Hazaribagh area contribute the largest share of pollution load in the Buriganga. Survey revealed that the tanneries pump out about 16,000 cubic metre of hazardous liquid wastes whereas Tejgaon Industrial area offloads about 4,000 cubic metre of polluted liquid wastes and other agencies about 3,000 cubic metres of wastes into the Buriganga every day. The amount of damage done by industrial effluents has far exceeded other sources. In most of the localities the household waste drains connect to the sewer pipe, which also collect road-surface garbage. Consequently, the entire untreated mess then drains into the river that supplies the city with its drinking water. Contaminated even further by oil from barges and leaky vessels, the river is so polluted that the cleansing effect by surging rainwater alone has become almost impossible. In fact, the cleansing effect is no match for the 33,000 cubic metres of solid and liquid wastes of all varieties and sewage dumped into the river each day.

Recent reports suggest that the Buriganga may have been polluted beyond redemption. Indiscriminate dumping of industrial effluent and human waste has condemned the lifeline of the city to a slow death. Authorities must act now and initiate a massive cleanup, not only for the river but also for the city of teeming millions, writes Md. Asadullah Khan



And quiet flows the slow killer

PHOTO: ZAHEDUL I KHAN

The biggest onslaught has come from the encroachment of riverbanks and the river itself. Even supermarkets have been built, intruding several hundred feet into the river from its original bank line. About 40 acres of the riverbed has fallen into the hands of the encroachers who enjoy political patronage. With the government and the industries not investing in hazardous waste removal plants, the volume of effluents is growing exponentially. Antique foundries and related industries and tanneries are functioning in complete disregard of environmental norms. Sewer pipes hardly work in the old parts of the city. In most cases the sewer lines lead to drains, which take the sewage all of it untreated directly into the river, killing virtually all aquatic life and rendering the river water unsuitable for human use. On the other hand, textile mills, dyeing industries and tanneries have destroyed land and groundwater. It comes out in chemical-tinted hues - some calls it "coca cola". The factories continue production on the sly and continue to dump untreated wastes. The tanneries, textile mills and dyeing industries are largely to blame for this sorry state of affairs. The tanning process, it is known, uses more than 250 chemicals. The owners of these factories were hardly jolted into action any time in the past and they dumped their wastes wherever they could all these years. There were hardly any plan or initiative to construct a common effluent treatment plant for any sort of

industries. The exasperated chief of the Dhaka WASA while admitting the soaring pollution levels in the Buriganga water told a reporter that the effluent treatment plant can't cope with enormous wastes and the polluted. WASA pipeline water mainly drawn from the river Buriganga defies all solution.

But solutions must be found. That calls for taking some hard decisions about relocating industries, re-examining industrial siting and environmental policies. At least some tough decisions about relocating the hazardous industries must be taken without further delay. With a third of the country's population slated to live in the urban areas, the government in collaboration with the industries must set up funds for pollution treatment. Experts recommend tackling the problem at its source - when permission to set up a factory is first granted. Most large units henceforth have to submit an environmental impact assessment (EIA), a document that lists the effects a factory might have on its surroundings. What is most necessary is a high-powered central pollution control board composed of experts in engineering, medicine, chemistry, and biological science, especially microbiology. They should explore or work on a zoning atlas, a massive nation-wide exercise that will eventually specify the kind of industry that a region can bear. In West Bengal, harried by regulatory pressure the chemical industry has asked for an exclusive zone,

where wastes can be collectively handled.

Another decision has to be taken about small-scale industries. It should be made clear to all such entrepreneurs that these would not be allowed to enter certain fields, like chemicals. Studies indicate that pulp and paper industries below a capacity of 80 tonnes a day are not economically viable if they install pollution control equipment.

However daunting the solution might be, the river Buriganga has to be saved. Reports have it that the Department of Environment (DOE) while identifying key sources of pollution load of the river mentioned discharges from Rayerbazar sluice gate, through Dholaikhal, through Pagla sewage treatment plant, hanging latrines along the banks of the river, Hazaribagh tanneries and Tejgaon industries. Other than these the DOE further identified about 120 installations for encroachment of the river mostly by influential persons and political leaders. Among the installations are factories, mills, households, dockyard mosques, madrassahs, vegetable markets and store yards for vegetables and fruits.

What is most needed is the establishment of a Buriganga authority invested with the power to evict illegal construction and settlements along the bank of the river. The wide ranging power will include the task of river safety maintenance involving setting up a centralised effluent treatment plant as well as dredging the river for smooth flow of all types of effluents. Admittedly, WASA and city corporation lack the resources and technical and managerial expertise to deal with the trash and hazardous waste crisis of an increasingly consumerist economy. There are landfills at certain locations of the city but these are hotbeds of disease and innumerable poisons leaking into their surroundings. Wastes putrefy in the open, inviting disease-carrying flies and rats and a filthy poisonous liquid called leachate, which leaks out from below contaminating groundwater that ultimately gets into the river. Residents in the city now know by sure that they are being slowly poisoned by industrial by-products, leaking from all types of industries. They face disability and even death as thousands of industries big or small produce and reprocess the products of industrial success: a class of toxic metals and chemicals called hazardous wastes including lead, mercury, cadmium and chromium.

As for sewage disposal system, it is totally dysfunctional. Sources say that Dhaka WASA at present has the capacity to treat sewage of about 40 lakh population of the metropolis. So at least a half of faecal load of the city ultimately finds its way to the river, totally untreated. The Buriganga has ultimately turned into a giant sewer, chiefly from raw sewage. The situation has resulted from the fact that most water pipelines run next to sewer lines and as such in recent times the threat of contaminated water and disease is constant. With commitment, initiative and sincerity no problem defies solution. In view of the present catastrophic situation environmental levies must be charged and environmental formalities must be simplified. The levies can be used to fund woefully understaffed regulatory agencies and support research for environmental fixes for specific industries. Instances are there that much of Tamil Nadu's tannery products are exported. Already countries like Germany ban imports of materials made using environmentally harmful dyes. Governmental support for such laws will impel industry to clean up. But government cannot do it alone: citizens must join the big cleanup. The option is to drown in your own waste. At the same time, industrial societies have an obligation not only to recycle but also to reduce the waste they generate.

## ENVIRONMENT WATCH

### Saving the South China Sea, Gulf of Thailand

Seven nations sign first agreement to protect marine resources

AFP, Bangkok

The United Nations Wednesday said the seven nations bordering the South China Sea and the Gulf of Thailand had signed their first agreement to protect the region's marine resources.

The nations have agreed to take action on environmental degradation along the coastlines and after an extensive study of sensitive sites, they hope to enact national legislation to prevent further damage.

United National Environment Program executive director Klaus Toepfer said that the preservation of the coastlines was vital for the protection of the region's rich fisheries industry.

"It is one of the most important programs we have for international seas," he said after unveiling the agreement between the governments of Cambodia, China, Indonesia, Malaysia, the Philippines, Thailand and Vietnam.

Toepfer said 80 per cent of the region's coral reefs were at risk from climate change, coastal development, pollution, overexploitation and cyanide and dynamite fishing.

"Tuna and shrimp are outstanding products earning a lot of money for people. Therefore it is very difficult and there are a lot of economic pressures that make it difficult to stop or change (these practices)."

He said only a third of the region's mangrove forests remain, with around 65 per cent lost to settlements, industrialisation, tourism, or conversion into shrimp farms.

The effects of increased sedimentation and nutrients as well as destructive fishing practices were also being felt in the region's other major habitat, sea grass communities, of which 20-25 per cent is thought to be degraded.

Another major concern is the pressure exerted by the 270 million people living along the coastlines, a population expected to double within the next three decades.

Toepfer said the new agreement would produce a programme of action and a recommended network for regional co-operation in the management of the environment of the South China Sea.

Under a five-year, 32 million dollar project, committees will be set up in each country to select nine areas for extensive pilot studies, particularly on the coral reefs, mangrove forests and sea grass fields.

### Foot-and-mouth crisis continues



PHOTO: AFP

Two lambs lie in a field near Penrith, before being rounded up for slaughter on March 28, as the foot-and-mouth crisis in Britain continues. Smoke rises from fires of burning livestock above the town in the distance.

## Changing climate for disease and death

CLIMATE change will have wide-ranging and mostly damaging impacts on human health,' warns Dr Paul Epstein in a recent study entitled Human Health and Climate Change. 'There have been periods of uncontrollable waves of disease that radically altered human civilisation in the past, such as when Europe's population was devastated by bubonic plague in the Middle Ages. That problem was associated with population growth and urbanisation.

'Now a warming climate, compounded by widespread ecological changes, may be stimulating wide-scale changes in disease patterns,' Epstein remarks. His study seems to suggest that climate change could have an impact on health in three major ways, by:

- (a) creating conditions conducive to outbreaks of infectious diseases,
- (b) increasing the potential for transmissions of vector-borne diseases and the exposure of millions of people to new diseases and health risks, and
- (c) hindering the future control of disease. 'There are indications, he notes, 'that this disturbing change has already begun.'

### Conducive conditions

According to Epstein, extreme weather brings about a drastic increase in pests and hence the spread of diseases. 'Climate restricts the range of infectious diseases, while weather affects the timing and intensity of outbreaks,' he observes. Rates of insect biting and the maturation of microorganisms within them are temperature-dependent and both rates increase when the air warms.

'Warming can also increase the number of insects... Between the limits of too hot and too cold is an optimum range of temperature in which warmer air enhances metabolism and the chances of disease transmission,' the study reveals.

According to Epstein, 'Fossil records indicate that when changes in climate occur, insects shift range far more rapidly than do grasses, shrubs and forests.'

Epstein also provides several examples of the strong link between climate change and the increase of pests. He begins with that of heavy rains producing insect-breeding sites, driving rodents from burrows, and contaminating clean water systems. He then goes on to a few specific examples. In southern Africa, rodent populations exploded in 1994, following heavy rainfall in 1993 that had been preceded by a prolonged drought. As a result, the maize crop in Zimbabwe was crippled and plague broke out in Zimbabwe, Malawi and Mozambique.

### Climate changes and disease clusters: the case of El Niño

According to Dr Epstein, the 1997-98 El Niño event, which was the strongest of the century, resulted in 'a cluster of diseases'. Its impacts were felt worldwide.

As extreme droughts and fires occurred in Asia, across Mediterranean nations, in the Amazon, in Mexico's tropical rainforest, in Central America and in Florida, US, the incidence of respiratory illness, cardiovascular disease and eye irritations rose dramatically. Droughts led to increased cholera in many tropical regions. Heat waves killed thousands in India, and hundreds in the US and Central Europe. The Horn of Africa was deluged and experienced upsurges of cholera, malaria and Rift Valley Fever, which killed both humans and livestock.

In Latin America, flooding along the Pacific coast and in southern Brazil resulted in increases in cholera and vector-borne diseases (VBDs), and many South American nations experienced outbreaks of rodent-borne hantavirus. In south-western US, rodent populations began to explode in January and February of 1998, which was extremely early, and cases of HPS occurred during that spring. The most devastating floods since 1949 occurred in China as El Niño waned and La Niña began its cooling of the Western Pacific Ocean.

Both El Niño and La Niña bring climate extremes to many regions around the globe. During the cold phase, from 1995 to 1996, many regions of the world experienced intense rains and flooding, following prolonged drought. Such rains have been associated with outbreaks of Murray Valley encephalitis and Ross River virus in Australia, and malaria in Argentina, southern Africa and Pakistan.

The dry phases that preceded the wet phase of El Niño also resulted in an increase in the incidence of disease. For example, meningitis epidemics 'are associated with severe drought conditions, which apparently dry our mucus membranes, making them vulnerable to penetration by colonising organisms'. In sub-Saharan Africa, the 1995-96 outbreak was among the largest ever recorded: over 100,000 people contracted the disease and died. Extreme climate changes like El Niño can in fact result in disease clusters.

The combination of climate change and environmental degradation has created ideal conditions for the emergence, resurgence and spread of infectious diseases - diseases which kill more than 17 million people annually. Increased climate change has also altered the functional balance among predators and prey, which is important for controlling the proliferation of pests and pathogens. Warmer and sometimes wetter weather may already be extending the range of infectious diseases beyond regions where they are endemic. These were some of the disturbing conclusions of a study by Dr Paul Epstein of the Centre for Health and Global Environment, Massachusetts, USA. Martin Jalleh highlights the warning signals of the dangers to human health posed by climate change to which Dr Epstein draws attention in his study.

Epstein's study claims that '...other diseases likely to increase and change in connection with the climate include Guinea worm, leishmaniasis, lymphatic filiasis, onchocerciasis, and Chagas' disease, which altogether affect more than 147 million already.'

Another major conclusion made by Epstein is that 'the combination of climate change and environmental degradation can create ideal conditions for the emergence, resurgence and spread of disease'.

He quotes a 1996 World Health Organisation report which states that at least 30 infectious diseases new to medicine have emerged in the past 20 years.

Dengue, or breakbone fever, which had essentially disappeared in the Western Hemisphere, has now reappeared in the Americas, infecting over 200,000 people in 1995. Also in 1995, the largest epidemic of yellow fever in the Americas since 1950, struck Peru.

Forms of hantaviruses have resurged in several European nations, particularly in the former Soviet Union and in the war-torn former Yugoslavia. In 1994, plague resurfaced in India following a blistering summer, when temperatures reached 51 degrees Centigrade (124 Fahrenheit), and an unusually heavy monsoon season.

Epstein also draws attention to another exceptional trend - 'some infectious diseases are emerging for the first time in developed nations.'

Hantavirus pulmonary syndrome (HPS) and Lyme disease first appeared in the United States. Toxic E.coli 0157 has been a particular problem in the United States, Europe and Japan.

### Transitions spur on transmissions

It is also Epstein's contention that warmer and sometimes wetter weather may already be extending the range of infectious diseases beyond regions where they are endemic and inhabitants have some immunity.

He claims that 'global warming is predicted to bring warmer winters to many places, and therefore increasing the potential for transmission of vector-borne diseases at higher latitudes and elevations.' He uses malaria and dengue fever to support his argument.

According to Epstein, malaria is already being reported at unusually high elevations in the mountains of Central Africa as well as Ethiopia and parts of Asia.

'Highland urban centres, like Harare, Zimbabwe and Nairobi, Kenya, are at increasing risk of outbreaks and are largely unprepared to deal with them.'

Epstein highlights a study which suggests that the proportion of the globe that could sustain malaria transmission would increase from 45 to 60 per cent with the doubling of CO2 emissions.

### Climate change and cholera

Dr Paul Epstein contends in his study that contrary to the popular opinion that our modern world has been cleansed of the epidemic scourges of ages past, 'some diseases such as cholera - an acute and sometimes fatal disease that is accompanied by severe diarrhoea - affect more nations today than ever before'. He links such a situation to climate change. He traces the recent history of the cholera epidemic, beginning with the Seventh Pandemic which started when the El Tor strain left its traditional home in the Bay of Bengal in the 1960s, travelled east and west across Asia and penetrated the continent of Africa in the 1970s.

In 1991, the cholera pandemic reached the Americas and during the first 18 months more than half a million cases were reported in Latin America, with 5,000 deaths. The microbe that transmits cholera, *Vibrio cholerae*, is found in a dormant or 'hibernating' state in algae and microscopic animal plankton, where it can be identified using modern microbiological techniques. However, once introduced to people through consumption of contaminated water

or contaminated fish or shellfish, cholera can recycle through a population when sewage is allowed to mix with the clean water supply.

Epstein reports that in late 1992, a new strain of *Vibrio cholerae*, O139 Bengal, emerged in India along the coast of the Bay of Bengal. With populations unprotected by prior immunities, this hardy strain quickly spread through adjoining nations, threatening to become the agent of the world's Eighth Cholera Pandemic. For a time, in 1994, El Tor regained dominance, but by 1996, O139 Bengal had reasserted itself. Epstein concludes that 'The emergence of this new disease, like all others, involved the interplay of microbial, human host and environmental factors.'

His study also refers to the largest and most intense outbreak of cholera ever recorded, which occurred in Rwanda in 1994, killing over 40,000 people in the space of weeks, in a nation already ravaged by civil war and ethnic strife. 'It is a reminder of the impacts of conflict and political, as well as climatic and ecological, instability on public health and biological security,' he asserts.

'Approximately 270 million are affected by malaria worldwide. Global warming may cause one million additional deaths from malaria each year,' Epstein warns.

Epstein also believes that climate change is a major cause of the spread of dengue fever, which now occurs regularly in Asia and throughout Latin America. 'It is projected that global warming will significantly increase the range conducive to the transmission of both dengue and yellow fever,' says Epstein. 'As if to confirm these predictions, dengue fever has been reported at higher elevations than before, at 1,240 metres in Central America, 1,000 metres in Mexico and *Aedes aegypti* was found at 2,200 metres in the Colombian Andes,' he adds.

The transmission season may also be extended in regions that now lie on the margins of the temperature and moisture conditions that allow disease carriers to reproduce. Epstein uses encephalitis as yet another example of a close and real connection between climate change and the spread of vector-borne diseases.

Mosquitoes can transmit several viruses that cause inflammatory brain diseases in humans. Among these encephalitis are Japanese, eastern equine (in the US), Venezuelan equine, and others. The most common of these infections in the US, for example, is St. Louis encephalitis (SLE). Epidemic outbreaks are strongly associated with periods of a few days when temperatures exceed 300C. Particularly wet late winter months followed by summer drought, may exacerbate the threat. According to Epstein, global warming in the US could result in a more frequent and more northerly occurrence - even up to Canada - of a disease that is currently limited mainly to southern parts of the country.

### Perishing predators, pervasive pests

A worrying trend which Epstein reports is the decrease in the number of predators (which also means an increase in pests) as a result of climate change. Epstein emphasises the role of predators. He says healthy ecosystems with preserved predator/prey ratios provide the natural biological controls over infectious diseases and their carriers.

Freshwater fish, birds, reptiles and bats limit the abundance of mosquitoes. Owls, coyotes and snakes help regulate populations of rodents. Some rodents are involved in the transmission of Lyme disease, hantaviruses, arenaviruses (haemorrhagic fevers), leptospirosis and human plague. He provides examples of the drastic consequences of the impact of climate change on predators.

In the south-western region of the United States, a prolonged drought prior to the spring of 1993 reduced populations of rodent predators such as

those mentioned above. With the heavy spring rains, rodent populations multiplied 10-fold and hantavirus pulmonary syndrome (HPS), a deadly new disease, emerged.

Over 150 people in the United States have suffered from this viral disease and almost half of them have died. Outbreaks of HPS have also occurred in many Latin American nations since 1995. The heavy rains also provided a crop of grasshoppers and pine nuts which served as nourishment for the deer mice that carry hantaviruses. Thus, HPS may be deemed a 'new disease', the transmission and dissemination of which are mostly attributed to the increased climate variability accompanying climate change.

### Catastrophic costs

Climate changes can result in catastrophic costs to nations, argues Dr Epstein.

'From the international policy perspective, the resurgence and spread of diseases could affect trade, travel and tourism and strain already fragile North-South relationships,' Epstein emphasises in his study. He sees children and the elderly, and particularly the poor, as most vulnerable to the risks posed to human health as a result of climate change. He lays bare the economic costs of indifference and inertia to climate change: 'The impacts of disease on humans, agriculture and livestock are also costly. The 1991 cholera epidemic cost Peru over US\$1 billion in lost seafood exports and tourism. In India, airline and hotel industries lost over US\$2 billion from the 1994 Indian plague.'

'Cruise boats are turning away from islands wrecked by dengue fever. This could pose threats to the Caribbean's US\$12 billion tourism industry, for example, which employs 500,000 people.'

Even rich nations will have to pay a costly price: 'In the United States, *Pfisteria piscida* outbreaks, which have caused fish mortality and human illness (prolonged memory loss and respiratory symptoms), have cost sea-food and tourism companies and federal agencies millions of dollars.

'Worldwide, the rise in severe wind and flood-related events has caused extraordinary losses for property insurers...In the United States, Federal Emergency Management Agency payments quadrupled in the 1990s from those in the 1980s. Prior to 1989, single-event insured losses had never exceeded US\$1 billion per year. Since then, annual insured losses have risen four to five fold.'

Epstein reports that insurers already estimate that health-related and environmental restoration claims over the next 30 years may reach US\$50 to \$125 billion.

'In marine systems, fish, shellfish and sea mammals help to regulate algae - some toxic, others anoxic. Destruction of habitat worldwide is reducing predator populations, and global warming may be increasing the ability of many disease vectors to survive and reproduce,' Epstein comments. According to him, 'warming may also compromise the immune system of sea mammals and coral, and encourage the growth of harmful bacteria and viruses in their tissues.' He adds: 'Among the possible consequences of disruption in almost any marine ecosystem is an increase in the opportunistic pathogens that can abet the spread of human disease, sometimes to widespread proportions. One example is cholera.'

### Changing course

The climate scenario is likely to take a turn for the worse, warns Epstein. He quotes the Second Intergovernmental Panel on Climate Change (IPCC) Report, which asserts that the frequency of very hot days is likely to increase, resulting in an approximate doubling of heat-related deaths in affected cities. Sea surface temperatures have risen during the last century. Warming has also been detected deep in the Atlantic, Pacific and Indian Oceans, and around both poles. The oceans may turn out to be the long-term repository of this century's global warming.

Epstein predicts that 'wide swings in weather patterns may become the norm, as sea surfaces and deeper waters continue to absorb and circulate the heat accumulating in the troposphere. At the same time, abrupt changes in climate - hopefully small enough to provide a warning and without widespread disruption - may be in store.' He pleads in conclusion: 'We cannot afford to continue 'business-as-usual' (BAU). Changing course will not be easy, but it is necessary. There are costs associated with acting now to slow global warming. However, in terms of future health care, productivity, international trade, tourism, and insurance costs, the savings could be huge.'

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