ENVIRONMENT

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Pollution causes 15,000 deaths annually

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AIR pollution kills 15,000 Bangladeshis each year, according to a World Bank report released recently. The report says Bangladesh could save between $200 million and $800 million per year -- about 0.7% to 3.0% of its gross national product -- if air pollution in the country's four major cities was reduced.

The report adds that 6.5 million people in those cities suffer each year. And the major disease in Bangladesh is not diarrhea, as is the general perception, but the acute respiratory infections caused mainly by the polluted air. Automobile and industrial emissions, bad civic practices and poor government services are some of the major factors causing Bangladesh's air polluted.

The World Bank gave Bangladesh $4.7 million last July to fund an air quality management project. It also supports a training programme for drivers of different vehicles to teach them how to reduce emission. But, unfortunately no remarkable implementation of such initiatives has yet been made.

Air pollution kills an estimated 2.7-3.0 million people every year throughout the world, which is about 6 per cent of all annual deaths. About 9 deaths in every 10 due to air pollution take place in the developing world, where about 80 per cent of all people live. Again out of this 2.7 million, 1.6+ million die in Asian countries only.

In cities that lack pollution control, millions of people are at risk from air pollution. Densely populated and rapidly growing cities such as Bangkok, Manila, Mexico City, and New Delhi are often entombed in a pall of pollution from fume emitting trucks and cars and from uncontrolled industrial emissions. In 1995, for example, the average ozone concentration in Mexico City was about 0.15 parts per million, 10 times the natural atmospheric concentration and twice the maximum permitted in Japan or the US.

The density of lead in the air of Dhaka is 463 nanograms per cubic metre, which is ten times more than that in the acceptable standard and several times more than the above mentioned cities, even than the most polluted city of Mexico. Following are some data in support of the above statement:

In a seminar organized by Sunder Jiban at ICDDR,B the content of lead and cadmium in the blood of the children in Dhaka city was revealed. The study was conducted at some important parts of the Dhaka city, such as the Tejgaon Industrial Area, Mohammadpur, and Keraniganj. A group of nine children from other parts of Dhaka city admitted to the CRSC of ICDDR,B was used for comparison. The specific aim of the study was to determine the blood lead (Pb) and cadmium (Cd) levels in children. It was found that both Pb and Cd levels in the blood of the children from high-risk areas were alarmingly high. These could be due to high lead in the environment from gasoline, paints, ceramics, batteries, etc. High Pb in hospitalized children indicates general contamination in the Dhaka city. Young children are mostly exposed to Cd through inhalation of smoke and contaminated dust from industrial emissions and sewage sludge.

An appropriate measure must be taken as soon as possible, otherwise the suffering of the children (specially who are at age between 4 and 7) from gastrointestinal disorders, anemia, insomnia, weight loss, motor weakness, muscle paralysis, nephropathy, school drop-out and behavioural changes, may paralyze the nation in future. Not only that, this level of lead poisoning is a major factor responsible for decreasing the mental abilities of the children as a result of which the country will have acute shortage of intellectuals in the long run.

Lead pots, pipes, and smelters are usually held responsible by the experts for loss of intelligence among children and for brain damage and abnormal behaviour among adults. Heavy metals released into the environment today come by way of uncontrolled emissions by metal smelters and other industrial activities, unsafe disposal of industrial wastes and lead in water pipes, paint, and gasoline.

The heavy metals most dangerous to health include lead, mercury, cadmium, arsenic, copper, zinc, and chromium. Such metals are found naturally in the soil in trace amounts, which even pose many problems. When concentrated in particular areas, however, they present a serious danger. Arsenic and cadmium, for instance, can cause cancer. Mercury can cause mutations and genetic damage, while copper, lead, and mercury can cause brain and bone damage. Lead additives in gasoline cause widespread health problems. In Thailand, for example, a 1990 study found that some 70,000 children in Bangkok risked losing four or more points of IQ because they were heavily exposed to lead emissions from motor vehicles. In Latin America, some 15 million children under the age of two are at risk of ill health from lead pollution.

Air pollution is not only a health hazard but also reduces food production and timber harvests, because high levels of pollution impair photosynthesis. In Germany, for example, about US$4.7 billion a year in agricultural production is lost due to high levels of sulfur, nitrogen oxides, and ozone.

The World Health Organisation estimates that about 700,000 deaths annually could be prevented in developing countries if three major atmospheric pollutants -- carbon monoxide, suspended particulate matter, and lead -- were brought down to safer levels. The direct health cost of urban air pollution in developing countries was estimated in 1995 at nearly US$100 billion a year. (Chronic bronchitis alone accounted for around US$40 billion).

The following stringent measures can be fully implemented and also adopted without wasting further time to save the huge amount by making the atmosphere environment-friendly:

- λ 'Strong political will' to protect the environment;
- λ Complete ban on import and use of lead containing materials;
- λ Complete ban on 2-stroke engine vehicles, as envisaged;
- λ Strictest measures to convert the baby-taxies and tempos to environment-friendly ones or phase those out through double-deckers and other heavy vehicles, as envisaged;
- λ Immediate screen-out of unfit vehicles and strictest measures to ban their plying on the streets, as envisaged;
- λ Safe disposal of industrial waste;
- λ Possible interventions/mitigation for exposed population;
- λ Maintenance of optimal nutritional status of essential metals;
- λ Creating more and more public awareness on the sources and causes of exposure to these toxic elements;
- λ Strict enforcement of existing laws and creation and enforcement of new laws, if necessary;
- λ Formation of a national steering committee including NGO representatives with administrative powers;
- λ International convention on climate change to come to a consensus for a global challenge to improve the living standards without destroying the environment;
- λ The UN sanction can be imposed on the countries, where environmental condition come below the standard level, as it is a matter of human rights.

Conclusion:

We do not want to die so disastrously. We will fight against the evil forces polluting our environment. We urge all concerned citizens of the country to unite and move in a body to create pressure on the government to save the environment for the sake our children who will hold the steering wheel of the country in the future. Now is the time to get the politicians committed to do the work for the nation. Let us take all possible steps to make people understand the environmental situation of the country and the importance of safe environment.

Gas exploration can harm the marine environment

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THE first important feature of interaction between gaseous traces and marine organisms is the quick fish response to a toxic gas as compared with fish response to other dissolved or suspended toxicants. Gas rapidly penetrates into the organism especially through the gills and disturbs the main functional systems (respiration, nervous system, blood formation, enzyme activity and others). External evidence of these disturbances includes a number of common symptoms mainly of behavioral nature, for example, fish excitement, increased activity, scattering on surface water). Further exposure leads to chronic poisoning. At this point, cumulative effects at the biochemical and physiological level occur. A general effect typical of all fish is gas emboli. These emerge when different gases including the inert ones oversaturate water. The symptoms of gas emboli include the rupture of tissues, enlarging of swim bladder, disturbances of circulatory system, and a number of other pathological changes.

Field and experimental studies support the previously described general pattern of fish response to the presence of methane and its hamologues in the environment. In the Sea of Asov, researchers conducted detailed observations after accidental gas blowouts on drilling platforms during summer-autumn of 1982 and 1985 [GLABRYBVOD, 1983; AzNIIRKH, 1986]. The results of these observations indicate the existence of a cause-effect relationship between mass fish mortality and large amounts of natural gas input into the water after accidents.

It was found that the fish in the zones of the accidents developed significant pathological changes. In particular, they displayed impaired movement coordination, weakened muscle tone, pathologies of organs and tissues, damaged cell membranes, disturbed blood formation, modifications of protein synthesis, radically increased total peroxidase activity and some other anomalies typical of acute poisoning of fish. These pathological changes were found even in the fish collected at a considerable distance from the place of accident.

Besides the ichthyotoxicological data, studies on gas accidents in the Sea of *Asov* give some idea about the methane pollution of the water environment and its possible impact on the benthic and pelagic communities. Methane represented over 95 per cent of the released gas. It was present in water in concentrations of 4-6 mg/1 directly near the accidental well and in concentrations of 0.07- 1.4 mg/1 at a distance of 200 metres from the platform. These results suggest that methane and its homologues can stay in the water environment for a rather long period and spread over considerable distances. Similar conclusions were made based on observations in the Gulf of Mexico, where the areas around offshore drilling rigs had extremely high concentrations of methane and ethane in the water [Sackett, Brooks, 1975].

The composition of natural gas varies. It depends on the origin, type, genesis and location of the deposit, geological structure of the region and other factors. Natural gas chiefly consists of saturated aliphatic hydrocarbons, i.e., methane and its homologues. The deeper the location of gas deposit, the higher the number of methane homologues. In gas condensate fields, the content of methane homologues is usually considerably higher than the level of methane. In gases associated with oil, the content of methane homologues is comparable with the content of methane.

Other components commonly found in natural gas are carbon dioxide, hydrogen sulfide, nitrogen and helium. Usually, they constitute an insignificant proportion of natural gas composition. However, in some areas, their concentrations can be considerably higher. The global consequence of all these anthropogenic impacts is the gradual increase of methane concentration in the atmosphere over the last 100 years -- from 0.7×10^{-4} per cent to 1.7×10^{-4} per cent (in volume). Many scientists believe that gases released due to human activities have already begun to affect the earth's overall temperature and the methane anthropogenic emission is responsible for about 30 per cent of the total warming effect. If the concentrations of methane and other greenhouse gases in the atmosphere keep increasing, global changes in climatic conditions on the earth will be noticeable in the near future.

Another component of natural gas -- hydrogen sulfide -- is water soluble in contrast with methane. It can cause hazardous pollution situations in both the atmosphere and the water environment. Its proportion in the composition of natural gas and gas condensate, as previously mentioned, sometimes reaches more than 20 per cent. Pollution by hydrogen sulfide can lead to disturbances in the chemical composition of surface waters. This gas belongs to the group of poisons with acute effects. Its appearance in the atmosphere and hydrosphere can cause serious economic damage and medical problems among local population. For further instance, in Russia, air, soil, and water pollution by hydrogen sulfide and sulfur dioxide has been reported in a number of places. Especially severe consequences for human health and biota have been observed in the basin of the low Volga River in the zone of development of the Astrakhanskoe gas condensate field [Ecology and Impact of Natural Gas on Organisms, 1989].

Another potential source of gas in the hydrosphere is damaged gas pipeline, both on the seafloor and on land where they cross over rivers and other water bodies. The causes of such damage can vary from corrosion processes to natural disasters (severe ice conditions, seismic activity and earthquakes), it should be noted that hydrocarbon gases are piped over great distances totaling many thousands of kilometers. These pipelines cross hundreds of water bodies. Possible pipeline damages can lead to hazardous impacts on water ecosystems.

Pipeline ruptures

Drilling, transportation and storage accidents are the sources of environmental pollution at all stages of gas or oil exploration or production. Although the causes, scale and severity of the accident consequences are extremely variable. They depend on a concrete combination of many natural, technical and technological factors. To a certain extent, each accidental situation develops in accordance with its unique scenario.

The most typical causes of accidents include equipment failure, personnel mistakes and extreme natural impacts (seismic activity, ice fields, hurricanes and so on). Their main hazard is connected with the spills and blowouts of oil, gas and numerous other chemical substances and compounds. The environmental consequences of accidental episodes are especially severe, sometimes dramatic, when they happen near the shore, in shallow water or in areas with slow water circulation.

Complex and extensive systems of underwater pipelines have a total length of thousands of kilometers. They carry gas or oil, condensate and their mixtures. These pipelines are among the main factors of environmental risk during offshore oil developments, along with tanker transportation and drilling operations. The causes of pipeline damage can differ greatly. They range from material defects and pipe corrosion to ground erosion, tectonic movements on the bottom and encountering ship anchors and bottom trawls. From the statistical data it has been found that the average probability of accidents occurring on the underwater main pipelines of North America and Western Europe are, respectively, 9.3×10^{-4} and 6.4×10^{-4}. The main causes of these accidents are material and welding defects [Sakhalin-1,1994].

Although the modern technology of pipeline construction and exploitation under different natural conditions, including the extreme ones, achieved indisputable successes, however, pipeline gas or oil transportation does not eliminate the possibility of serious accidents and other consequences.

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