

heptachlor epoxide, and metabolites of chlordane compounds were also detected. DDT concentrations at two stations in the Pusan Bay exceed the ERM level (51.7 ppb) but the contamination levels of other sites were lower than the

guidelines. Lindane concentrations were lower than the ERM level (0.99 ng/g) except four stations of the Pusan and Ulsan Bay.

## **Degradation of Coastal Habitats and Aquatic Resources in the Upper Bay of Bengal: Is Aquatic Pollution to Blame?**

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Discharge of freshwater runoff from many rivers is a dominant factor that influences the dynamics of the coastal and marine ecosystem of Bangladesh. The marine and brackish water environment is threatened by different types of pollutants dumped directly or washed down through a large number of rivers and tributaries throughout the country before emptying into the Bay of Bengal. Reduced flows in a dry season lessen abilities of the Ganges River to dilute and disperse pollutants in drainage from the whole areas including upstream regions in India, Nepal, Bhutan and China. Most of the pollutants are in sediment form, deriving from the municipal and industrial wastes, agrochemical residues and pollutants discharged from ships and boats.

Since the Green Revolution of the late 70's, the use of agrochemicals both inorganic fertilizers and pesticides, has increased by 400%. It has been estimated that about 2000 t/year of pesticide residues are added to coastal waters through rivers at present. More than 900 polluting industries directly or indirectly discharge their untreated liquid and solid wastes into brackish water bodies. The Karnaphuli and the Rupsa-Bhrab rivers, which receive effluents from more than 300 industries in Chittagong and Khulna, are major carriers of in-

dustrial contaminants including Ammonia, Chromium, Mercury, Phenols and DDT. Reports about fish kills as well as mortality of post-larvae and juveniles in nursery grounds are available. The key endangered species that have water-based habitats include crocodiles, turtles, Gangetic dolphins, fish, water birds and otters.

The mangroves are at a point of severe depletion due to over-exploitation by an increasing population and greater demands for forest products. Ecological changes caused by biotic and edaphic factors as well as the horizontal expansions of shrimp farming have further exacerbated the situation. Small-scale and artisan type of fisher folk operating in estuaries and neritic waters have caused overexploitation of shrimp post-larvae, juveniles and pre-adults as well as fin fish to meet the increasing demands of export and a burgeoning population.

Flood control dykes and river dams have also affected the marine ecosystem. Overall ecological degradation reduced tidal plains and damages to the habitual nursery grounds as well as the natural fishery stocks have been immediate results. The consequences of pollution and the long-term effects on sea level rise by the global greenhouse effects are serious concerns in the near future.

## **Biogeochemical Circulation of C–N–P in the Ocean and the Environment**

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International Geosphere-Biosphere Programme (IGBP) was started in 1988 as one of the world-wide projects in the field of environmental problems under the organization of the International Council of Scientific Unions (ICSU). Prior to this, the two projects were launched, which are; SCOPE (Scientific Committee on Problems of the Environment) in

ICSU; and MAB (Man and the Biosphere) in UNESCO.

Biogeochemistry has been emphasized as the leading discipline particularly in IGBP, and therefore, the global distribution and circulation of chemical elements including nutrients have been investigated from the viewpoint of geochemistry.