Water Pollution

Causes and Control

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Dr. Shafqat Alauddin

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PREFACE

Without healthy water for drinking, cooking, fishing, and farming, the human race would perish. Clean water is also necessary for recreational interests such as swimming, boating, and water skiing. Yet, when Congress began assessing national water quality during the early 1970s, it found that much of the country's groundwater and surface water was contaminated or severely compromised. Studies revealed that the nation's three primary sources of water pollution—industry, agriculture, and municipalities—had been regularly discharging harmful materials into water supplies throughout the country over a number of years.

These harmful materials included organic wastes, sediments, minerals, nutrients, thermal pollutants, toxic chemicals, and other hazardous substances. Organic wastes are produced by animals and humans, and include such things as fecal matter, crop debris, yard clippings, food wastes, rubber, plastic, wood, and disposable diapers. Such wastes require oxygen to decompose. When they are dumped into streams and lakes and begin to break down, they can deprive aquatic life of the oxygen it needs to survive.

Sediments may be deposited into lakes and streams through soil erosion caused by the clearing, excavating, grading, transporting, and filling of land. Minerals, such as iron, copper, chromium, platinum, nickel, zinc, and tin, can be discharged into streams and lakes as a result of various mining activities. Excessive levels of sediments and minerals in water can inhibit the penetration of sunlight, which reduces the production of photosynthetic organisms.

Nutrients, like phosphorus and nitrogen, support the growth of algae and other plants forming the lower levels of the food chain. However, excessive levels of nutrients from sources such as fertilizer can cause eutrophication,

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which is the overgrowth of aquatic vegetation. This overgrowth clouds the water and smothers some plants. Over time, excessive nutrient levels can accelerate the natural process by which bodies of water evolve into dry land.

Thermal pollution results from the release of heated water into lakes and streams. Most thermal pollution is generated by power plant cooling systems. Power plants use water to cool their reactors and turbines, and discharge it into lakes and tributaries after it has become heated. Higher water temperatures accelerate biological and chemical processes in rivers and streams, reducing the water's ability to retain dissolved oxygen. This can hasten the growth of algae and disrupt the reproduction of fish.

Toxic chemicals and other hazardous materials present the most imminent threat to water quality. Some chemical plants incinerate toxic waste, which produces dangerous by-products like furans and chlorinated dioxins, two of the most deadly carcinogens known to the human race. Other hazardous materials are produced or stored by households (motor oil, antifreeze, paints, and pesticides), dry cleaners (chlorinated solvents), farms (insecticides, fungicides, rodenticides, and herbicides), and gas stations and airports (fuel).

Water pollution regulation consists of a labyrinth of state and federal statutes, administrative rules, and common-law principles.

—Dr. Shafqat Alauddin

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