

## **2.11 POLLUTION CASE STUDIES**

### **2.11.1 BHOPAL GAS TRAGEDY**

The careless siting of industries and relatively poor regulatory controls leads to ill health in the surroundings.

The Bhopal gas tragedy on December 2nd 1984, where Union Carbide's Plant leaked 43 tons of Methyl Isocyanate and other substances, used in the manufacture of pesticides is one of the worst industrial accidents in the recent past.

Of the 5,20,000 people who were exposed to the gas - 8,000 died during the first week and another 8,000 later. The impact of the survivors is visible even today.



**Bhopal gas tragedy plant**

### **2.11.2 CHERNOBYL REACTOR INCIDENT**

On April 25, 1986, Russian engineers and scientists begin preliminary tests on Chernobyl power plant's 4th reactor. In order to control the experiment, the automatic control system was shut down. After some work, stability was reached at very low power outputs. Unfortunately, manual control of the water pressure wasn't maintained. The reactor began to create excess heat. Without the automatic control, the control rods couldn't be reinserted in time; a deadly chain reaction had begun. Within a matter of 3-4 seconds, the reactor went from 5% output to 100 times its normal level.

The water in the reactor flash-boiled, creating an explosion that leveled thousands of tons of concrete and steel, including the housing for the reactor. The steam carried almost 70% of the nuclear material out of the reactor into the surrounding environment. Several thousand volunteers died on the scene, and it is estimated that 7,000 to 10,000 volunteers died in total, considering short and long-term effects. Thousands of miles from the scene, the birth defect rate became double the world average.



**Chernobyl Reactor**

It is also estimated that 150,000 were put at risk for thyroid cancer, and over 800,000 children were put at risk of contracting leukemia. 2 million acres of land (1/5 of the usable farmland in the Ukraine) was, and still is, completely unusable. It remains difficult to determine the scope of the disaster; radiation resulting from the event was detected all over the globe. It is estimated that it may cost up to \$400 billion and will take up to 200 years to correct the damage done to the area, and to compensate those affected by the meltdown.

### **2.11.3 ENVIRONMENTAL IMPACT OF ICELAND VOLCANIC ERUPTION**

The air traffic disruption caused by the Iceland volcano eruption in 2010 highlighted the environmental impacts of atmospheric dust from volcanic eruption. The volcanic ash, in effect pulverized rock, was spewed between 20,000 to 40,000 feet into the atmosphere right where modern aircraft ply their trade. This atmospheric dust not only hinders visibility but can also damage aircraft engines, forcing them to shut down completely. The fact that this disruption is not only affecting the countries of Europe, but has a knock on effect on all worldwide flights that have a European destination. Volcanoes can spew atmospheric dust and gases tens of kilometers into the earth's atmosphere where prevailing winds can very quickly transport them thousands of kilometers from the original eruption. Volcanic ash can lower visibility in the upper atmosphere and knock out aircraft engines.

Widespread ash from volcanic eruptions increase the Earth's "Albedo Effect", cooling the temperature of the lower troposphere while increasing the temperature of the stratosphere.



Volcanic activity is estimated to be responsible for the release of 130 million tonnes of carbon dioxide into the atmosphere annually. Sulfur dioxide, a major ingredient of volcanic activity, is the primary cause of environmentally damaging acid rain. It also forms sulfuric acid mists which causes pulmonary damage to both people and animals. Hydrogen sulfide, a colorless gas with an offensive odor, causes irritation of the upper respiratory tract and pulmonary edema. Atmospheric dust from volcanoes can act as a magnet for other pollutants and water vapor, giving rise to atmospheric hazes and heavy fogs.

#### **2.11.4 CASHEW IN KASARGOD, KERALA POISONOUS NUTS**

Endosulfan, a pesticide banned by many countries in the world including India was extensively sprayed aerially in the cashew plantations of Plantation Corporation of Kerala (PCK) spread over 2209 hectares in various divisions of Kasargod district, Kerala. Endosulfan is slated to be phased out globally under the Stockholm Convention 2001, to which India is a signatory. The pesticide is classified as an organochlorine compound and its breakdown products are persistent in the environment, with an estimated half-life of nine months to six years. It is known to potentially bioaccumulate in humans and other animals, in the liver, kidneys and fatty tissue. PCK started using this pesticide in 1979 and unusual health disorders were reported from places like Vaninagar, Adur, Mulleria, Padre etc. The people were unaware that this was a lethal poison.

A study conducted by the Centre for Science and Environment (CSE) confirmed the presence of high quantities of endosulfan in the samples of water, soil, fruits, mother's milk and blood in Kasargode. Further disorders of the central nervous system, cerebral palsy, mental and physical retardation, epilepsy and congenital anomalies like stag horns, liver cancer, blood cancer, infertility, miscarriages, hormonal imbalances, skin diseases and asthma have been reported. All these disorders were traced to endosulfan effects. After mass agitations and several reports by various agencies, the use of endosulfan was banned in Kerala in August 2001. Though, the state government has paid compensations, the rehabilitation of the living victims is really tough and challenging. Reports reveal that approximately, 224 people were critically affected and 226 have a 60percent disability. This tragedy was spread over 20 villages in the state. (Ref: Sushmitha Baskar and .R.Baskar)

#### **2.11.5 GROUNDWATER POLLUTION IN INDIA**

An example of groundwater pollution caused by excessive extraction is that fluoride contamination. It has spread across 19 states and across a variety of ecological regions ranging from the Thar desert, the Gangetic plains and the Deccan plateau. Source: When the bedrock weathers the fluoride leaches into water and the soil. surfaced during the last three decades - extraction of groundwater which has resulted in the tapping of aquifers with high fluoride concentrations was noticed during 1970s and the 1980s when there was massive state investment in rural water development for irrigation as well as for drinking. Encouraged by state subsidies on diesel and electricity, people invested in diesel and submersible pumps in a bid to extract groundwater through borewells. This policy aggravated the fluoride problem. Effects: combines with the bones as it has an affinity for calcium phosphate in the bones. Excess intake of fluoride can lead to dental fluorosis, skeletal fluorosis or non-skeletal fluorosis. Correction: - Defluoridation plants and household water treatment kits are stop-gap solutions. (Ref: Sushmitha Baskar & R.Baskar)

#### **2.11.6 MARINE POLLUTION IN TAMIL NADU: OCEANS NOT SPARED**

Industrial pollution has threatened the natural habitats of pearls in the pearl banks of Tuticorin coast in the Gulf of Mannar. It has affected fish and other organisms as far as 30 kms south of Tuticorin due to effluents released from chemical industries. Tannery wastes have caused the pollution of coastal waters from Chennai to Vedaranyam. The effect of diversity of phytoplankton ecology of mangrove estuaries of Tuticorin is greatly affected by industrial effluents. The Chennai coastal waters showed high levels of pesticides like DDT,

lindane, endosulphan and heptachlor. The bioaccumulation of these pesticides in marine organisms could pose major health hazards.

#### **2.11.7 NOISE HITS WHALES IN HONG KONG**

Studies have shown that shipping traffic in Hong Kong, which is one of the busiest ports in the world with approximately half a million oceanic vessels traveling through its waters every year (including over 10,000 transits by high speed ferries) has caused changes in the dolphin and whale behavior especially in response to fast moving vessels. A special sanctuary was established by the Hong Kong government in 1995, surrounding the islands of Sha Chau and Lung Kwu Chau, an important place occupied by the humpback dolphins. At any given time approximately 200 vessels surrounds this sanctuary. The sanctuary was a measure to mitigate boat traffic and tremendous noise produced. Adjacent to the sanctuary is an airport, where 700 planes descend and take off everyday, directly over the sanctuary. All the above activities have caused high noise input into the natural whale habitat. Noise, a major anthropogenic stress factor has caused a general decline in the whale populations.



#### **4.BHOPAL GAS TRAGEDY:**

On night of 3<sup>rd</sup> December 1984 in Bhopal city of Madhya Pradesh

At Union carbide India Ltd, which manufacture carbonate pesticides using methyl isocyanate (MIC)

Due to failure of coolant, the reactor got exploded & 40 tons of MIC leaked over 40 sq.km area.

**Nature of MIC:** It is a toxic gas, affects lungs, eyes & causes irritation in skin. Remove oxygen from lungs & cause death.

**Effects in Bhopal:** About 5000 persons died, 1000 became blind, 65,000 people suffered from eye, respiratory, neuromuscular problems.

#### **CHERNOBYL NUCLEAR DISASTER:(Nuclear pollution)**

In April 26 1986, melt down of the Chernobyl nuclear reactor in Russia, has leaked out the radioactive rays & radioactive materials.

**Effects:** about 2000 persons died, more suffered due to degeneration of cells, severe bleeding, anaemia, skin cancer, animals plants was also affected more.