

## **Brief on Water Pollution**

### **Water – the essential resource**

Fresh water as a commodity generates concern being an exhaustible resource and due to the environmental issues related to its degradation. Preserving the quality and availability of freshwater resources however, is becoming the most pressing of many environmental challenges for Pakistan. Perhaps, because water is considered a cheap readily available resource, there is not enough appreciation just how much stress human demands for water are placing on natural ecosystems.



### **Pressures**

The stress on water resources is from multiple sources and the impact can take diverse forms. The growth of urban megalopolises, increased industrial activity and dependence of the agricultural sector on chemicals and fertilizers has led to the overcharging of the carrying capacity of our water bodies to assimilate and decompose wastes. Deterioration in water quality and contamination of lakes, rivers and ground water aquifers has therefore resulted. The following sub-sections present a closer analysis of various sources of pressure on the country's water resource base.

### **Increasing Population**

In 2004, Pakistan stated a population growth rate of 1.9% while the projected figures reached 173 million by 2010 and 221 million by 2025. These estimates suggest that the country would slip below the limit of 1000m<sup>3</sup> of water per capita per year from 2010 onwards. The situation could get worse in areas situated outside Indus basin where annual average is already below 1000m<sup>3</sup> per head.

### **Water Shortage**

Water shortage is yet another major obstacle to the development of the country in terms of food security, economic development and industrialization. Even if an improvement of 50% in agricultural productivity with respect to the use of water is considerable, this however remains an unrealistic target. The water shortage in agriculture sector alone has been estimated at 29% for 2010 and 33% for 2025.



The pressures on water resource caused by the industrial growth also merit discussion due to their significant contribution to water pollution problems. Only a marginal number of industries furnish environmental assessment – 91% of multinational and 5 % of national industries. The national quality standards specifying permissible limits of wastewater are seldom adhered to.

## **Industrial Pollution**

Most industries in the country are located in or around major cities and are recognised as key sources of increasing pollution in natural streams, rivers, as well as the Arabian Sea through discharging toxic water. The contamination of shallow groundwater near industrial plants has been an area of concern as groundwater pollution is often permanent and it may take 100s or even 1000s of years for pollutants such as toxic metals from the tanneries to be flushed out of a contaminated aquifer.

In Pakistan, only 1% of wastewater is treated before being discharged directly into rivers and drains. For example in NWFP, 80,000 m<sup>3</sup> of industrial effluents containing a very high level of pollutants are discharged every day into the river Kabul causing observable incidents of skin diseases, decrease in agricultural productivity and decrease in fish population.

Sugarcane based industry, the 2<sup>nd</sup> largest in the country, is another major cause of industrial pollution due to large volume of wastewater containing high pollutant concentration. The product, distilled alcohol, is meant for the local market and export. The number of persons directly or indirectly connected with the industry is about 10 million. There are now 76 factories and a study of 4 distilleries showed that the ratio of the quantity of wastewater to the quantity of sugarcane used per day (m<sup>3</sup> tonnes) varies between 0.4 and 2. The installed capacity is 360,000 tonnes of sugarcane per day and it is estimated that the industry operates at 64% of its capacity. The wastewater generated is of the order of several hundred thousand m<sup>3</sup> per day. The wastewater is most often discharged directly into the drains or rivers. The pollution problem being severe in distilleries, they have, as a general rule, a storage system for wastewater, but as these systems are not well constructed the wastewater is discharged into the irrigation canals.

In Hyderabad, wastewater from the sugarcane industry is discharged directly into the drains without any prior treatment. Since 1993, EPA Sindh has taken several actions in order to reduce pollution. However, the sugarcane industry plays a very important part in the national economy and many farmers depend on it. Moreover, the time possible between the harvest of sugarcane and its processing is very short. Thus one of the easy ways of bringing pressure open to industrial workers is to call a strike at the time of the sugarcane harvest. In turn, the farmers, mainly the larger landlords, who have considerable political power, approach the government. Since 1996, only 2 industries in Sindh (out of 34) have installed mechanisms for wastewater treatment and that too, only because of international pressure as these industries (distilleries) export their products.

The tanneries are another source of large-scale pollution. In 2002, EPA Sindh initiated action against the tanneries located in the Korangi industrial area, in Karachi. The construction of a common wastewater treatment plant, co-financed by the government (export promotion council and the embassy of Netherlands), was started by the tanneries jointly in 2003. The second phase of project consists of introducing clean production techniques. Of the 170 tanneries concerned only 85 do not cooperate in this scheme.

Another source of pollution is the textile industry. Only the recent agreement of WHO contains sufficiently strong inducement to install a wastewater treatment system, indispensable to satisfy international standards. In terms of the generating environmentally damaging pollutants, textile processing industry is at the top of the list due to its size, followed by leather tanning, cement, chemicals and paper and pulp industries.

## Urban Pollution

The pollution by urban wastewater is very high. 2 million tones of urban excrement are produced every year and 50% of this ends up in the water. The area covered by sewerage system is still very low in Pakistan, only 54% in 2002. Moreover, where sewers exist, and that too often open, they are built in close proximity to the water distribution pipes, which leads to contamination due to leaks.

## Water Quality

The first national study on the quality of water was carried out by Pakistan Council of Research in Water Resources (PCRWR) in 21 cities, 6 rivers and 10 reservoirs and lakes. Bacterial contamination is very frequent in the country, particularly with the pressure of coliforms. In 17 cities, bacterial contamination is greater than 50% and in 4 of these cities, 100% of the samples were considered as unsuitable for human consumption. The inorganic contamination is also very high, particularly with fluorites, iron, sulphur and sulphates. A second study was launched in 2004 and preliminary results indicated that no appreciable improvement has been made in the above described conditions.

Water Quality of Rivers, Dams and Lakes

Source	pH	Turbidity (NTU)	TDS (mg/l)	Coliform (MPN/100ml)	E.Coli (MPN/100ml)
Simly Dam	8.2	6	192	> 16	> 16
Rawal Dam	7.9	24	208	> 16	> 16
Sutlej River	7.5	694	580	> 16	> 16
Mangla Dam	8.2	4	93	> 16	> 16
Ravi River	7.5	670	127	> 16	> 16
Lahore Canal	7.6	647	126	> 16	> 16
Swat River	7.3	36	46	> 16	> 16
Indus River	7.6	76	84	> 16	> 16
Kabul River	6.1	774	120	> 16	> 16
Khanpur Dam	8.1	2	222	> 16	> 16
Tarbela Dam	7.9	52	94	> 16	> 16
Hanna Lake	7.5	11	385	> 16	> 16
Hub River	7.2	6	756	> 16	> 16
Hub Dam	7.2	5	743	> 16	> 16
Hamal Lake	7.3	12	4652	> 16	> 16
Manchar Lake	7.6	134	5318	> 16	5
Torkhezai Dam	7.7	400	150	> 16	> 16
Jhelum River	7.8	419	132	> 16	> 16
Chenab River	7.6	580	115	> 16	> 16
Chashma Lake	7.8	183	132	> 16	> 16

Source: Pakistan Council of Research in Water Resources

The situation is even more critical in areas where in 113 out of 120 districts, less than half the population has access to proper drinking water and in 30 districts the figure is less than 10%, the most critical situation is found in Punjab (16 districts). It is estimated that 40 million residents depended on irrigation water for their domestic use, especially in areas where the groundwater

was brackish. The contamination of irrigation water by coliforms exceeds the limits set by WHO for unlimited irrigation and therefore exceeds the limits for drinking water.

Contamination by arsenic is becoming a serious problem. In Punjab and Sindh approximately 36% of population is exposed to level so contamination higher than 10ppb and 16% is exposed to contamination of 50ppb.

Two studies conducted by JICA and Pak-EPA in 2000 and 2003 respectively, examined water quality parameters of BOD, COD, total Nitrogen, TSS, oil and grease, Ecolil, Arsenic, Copper, Chromium, Cadmium, Lead and Zinc. Other parameters including flow rate temperature, pH, DO, conductivity, odour, turbidity, and colour were also measured. The studies compared data for the 5 cities – Lahore, Rawalpindi, Islamabad, Faisalabad and Gujranwala against different standards including Japanese, WHO, NEQS and standards set by USA and Indonesia.