STRATEGY FOR INDUSTRIAL WASTE WATER AND POLLUTION CONTROL

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Introduction:

Karachi not only has the largest port in the country but it is also the industrial hub of the country and the main source of pollution in the coastal waters of Sindh. There are currently over 6000 big and small registered industrial units operating in Karachi. These industrial units are located in Sindh Industrial Trading Estate (SITE), Landhi, Korangi, Malir and the Port Qasim Authority area (PQA). There are more than 65 categories of industrial plants in the established industrial estates including, textile industries, tanneries , pharmaceuticals, plastic and rubber industries, steel foundries, metallurgical industries, electroplating and metal coating industries, glass, ceramics and tiles industries, cement industry, soap and detergents, fish processing industries, chemical industries, power plants, fertilizers and pesticides edible oils, automobile cable and conductor manufacturing etc. The industrial estates do not have a combined waste treatment plant anywhere on the premises.

The current value of various coastal resources and services will continue to decline due to indiscriminate discharge particularly from land based activities. If sustainable pollution abatement practices are not adopted under integrated coastal area management, the resources will continue to be degraded. Appropriate protection and conservation measures should be adopted to secure the coastal resources for future generations.

II. Sewerage Discharge

It is estimated that approximately 362 million gallons per day (MGD) of sewage is generated in Karachi and adjacent areas from domestic and industrial sources. Approximately, 60 % are industrial effluents and 40% domestic discharges. The industrial waste-water and sewage are discharged into the two seasonal rivers: the Lyari River and the Malir River of Karachi. These rivers act as main open sewers for liquid waste disposal from the city. The Lyari and Malir Rivers are thus contributing about 59% and 25% of the total pollution load of Karachi City respectively, while 15% of the pollution load is directly discharged into the adjacent open seacoast or discharged via Gizri, Korangi and Gharo Creek. (Amjad and Rizvi, 2000).

Much of the sewage effluents discharged through the Lyari River find their way inside the semi enclosed Karachi Harbour area. During high and low tide, the discharged effluents oscillate within the Karachi Harbour (length 8.2 Km). Ali and Jilani(1995), 1995 conducted a chemical analysis of seawater samples taken from the Korangi industrial area effluent discharge site. The values of heavy metal in seawater far exceeded the permissible limits of National Environment Quality Standards (NEQS, the Gazette of Pakistan 2000). The harmful components (heavy metals, suspended solids, oil and grease, salts etc.) in the discharged effluents create a chemical imbalance and alter seawater chemistry. The biological amplification of heavy metals in seawater is that it enters the coastal food chain. The tainted heavy metal seafood if consumed, would impact the human brain, cause nerve damage, damage the kidneys, and cause birth defects. Absorption of excessive levels of carbon dioxide in the surface seawater can lower the pH of seawater converting it into a weak acid (Carbonic acid). Altered seawater chemistry can be injurious to the environmental health of the productive coastal ecosystem. The chemical can also alter seawater chemistry making it more corrosive for vessels, harbor craft and coastal installations.

III. Solid Waste Management:

Karachi city that has a population of about 18 million, generates approximately 8,700 tons of domestic solid wastes per day (Alam, 2010). There is a regular solid waste management system for Karachi City. Solid wastes such as garbage from domestic sources are collected by garbage collection vehicles and used in landfill sites. There is no arrangement for the disposal of hazardous solid waste except for the hazardous waste from hospitals. There are a few garbage / refuse collection sites within the city. The solid waste; about a 100 truck loads are carried from the collection sites. It is taken away by vehicles (open trucks and specially designed garbage vehicles) to either the composting center or to the two designated dumping / landfill sites for refuse located in the outskirts of the city (Deh Jam Chakro landfill site near Surjani Town and Deh Gond Pass landfill site near Hub Chowki).

At present, there is no incinerator for the disposal of solid waste except for hospital wastes, however, there are plans to acquire an appropriate capacity of incinerators for this purpose. The Karachi Metropolitan city has recently installed two incinerator plants (each has a capacity: 1,000 kg/hour for a maximum operation of 10 hours) for the disposal of hospital waste. Currently, the incinerator facility has been provided to five hospitals in the city, one Sindh Government Hospital, Korangi and two private hospitals which generate solid wastes of about 1250 kg to 1700 kg per day. The solid waste at the landfill / dumping site is mostly used for land-filling. A fraction of the solid wastes is also being recycled on a regular basis with the help of a few NGOs for re-use. However, the arrangements for garbage collection, composting and recycling are not adequate to handle the entire waste generated by the city. It is estimated that about 30-40 % of the solid waste remains out of the collection and disposal system and about 20 % is deposited in open sewers and storm water drains in the city while 20 % remains at the mercy of winds and land run-off for its final disposal (Alam 2010)**.**

Karachi water supply and sewerage infrastructure is a mixture of both old and some recent investments, it is generally inadequate to meet current urban needs since its development has not kept pace with the city's growth. In addition, much of the

existing infrastructure is poorly maintained and, therefore, does not operate efficiently. With some success, notable efforts have been made by the Government of Sindh, with the support of multilateral lending agencies, to improve the technical and commercial position of Karachi Water and Sewerage Board (KWSB). Despite this, water and sewerage services in Karachi remain limited, and given the commercial prominence of Karachi, compare poorly in many respects with major cities in South and East Asia.

IV. Pollution Management

Pollution control and management is the process of reducing or eliminating the release of pollutants and contaminants, which result from anthropogenic activities. 80% of all land based materials washed into rivers and streams discharge pollutants that flow towards the sea degrading the coastal ecosystems.

Pollution must be stopped at source. A wide variety of devices and systems have been developed to control air and water pollution and solid waste.

***A**ir pollution* control can be divided into two categories: the control of particulate emissions and the control of gases. Gases slow down in the long pipe, the solid particles settle out (Settlement Chamber). The particulates can then be removed from the bottom of the pipe.

***S**olid pollutants* consist of garbage, sewage sludge, paper, plastics, and many other forms of waste materials. One method of dealing with solid pollutants is simply to bury them in dumps or landfills. Another approach is to compost them, a process in which microorganisms turn organic waste into useful fertilizers. Finally, solid pollutants can also be incinerated at recommended temperatures to reduce toxic impacts of dioxins in the atmosphere.

***W**ater Pollution Control* falls into three general categories: physical, chemical, and biological. Chemical reactions can be used to remove pollutants from water. For example, the addition of alum (potassium aluminum sulfate) and lime (calcium hydroxide) to water results in the formation of flocks. The flocculation technique also carries with its solid particles that

eventually settle out. The most commonly used techniques for removal of pathogens and other microorganisms in water are chlorination and ultraviolet irradiation. The effectiveness indicator of disinfection in the water is measured by the number of fecal coliform bacteria. The European Communities (EU) set these values at 5000 total coliforms per 100ml at 37^0 C (WWF-P 2007).

V. Economic Significance of Coastal Zones

Continued and unplanned industrialization of Karachi has degraded the natural environment by destruction of habitats and by unabated pollution with the most serious problems affecting fresh water, and coastal ecosystems. A well-coordinated national programme of monitoring marine ecosystems and biodiversity designated protected areas should be initiated.

Biological resources are renewable and can increase with proper management. The highly diverse natural ecosystems which support the biodiversity also maintain hydrological cycles, regulate local climate, build soils, recycle the essential nutrients, absorb and breakdown pollutants. Many plants and animal species are now under threat of becoming extinct due to habitat degradation. The loss of biological diversity is likely to have a profound impact on development and provision of raw material for human communities. Since the coastal systems are sensitive to changes in the environment, there are uncertainties and risks involved; once a coastal ecosystem is damaged, it will have a far reaching impact on many uses of coastal amenities. Coastal zones are capable of producing rich fisheries, mineral, and oil and gas resources. The total economic wealth thus generated by the natural systems, coast depended activities and services, if properly assessed, may go into billions contributing to national GNP, (Amjad, 1998, 1999, Kidwai and Amjad 2000). By investing today in environmental issues and resources, Pakistan can reap enormous savings in trillions in the near future. Investments in Pakistan's environment today, would eventually contribute towards national economic growth. The importance of developing marine resources in the coastal zone of Pakistan has not been fully perceived.

It is suggested that:

- All existing and new industrial units utilizing 10,000 gallons of water per day, should have provisions for preliminary waste water treatment on their premises.
- Provincial government should allow one time tax free import of machinery and equipment for treatment plants.
- Tax incentives must be provided to old industries for setting up liquid waste water treatment facility making water reusable for greening parks.
- The sludge and treated water from large sewage treatment plants should be deployed for making the coastal areas greener.

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