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**Pakistan in the Grip of Deficient
Contemporary Environmental Technologies**

By

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PAKISTAN IN THE GRIP OF DEFICIENT CONTEMPORARY ENVIRONMENTAL TECHNOLOGIES

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ABSTRACT

The environmental technologies have undergone tremendous research all over the world to restore globally the original environment. All elements affecting the environment such as potable water supply, and wastewater both domestic and industrial effluents are not being catered for in accordance with the state of art in the profession of Environmental Engineering. The solid wastes and liquid wastes are to be managed in the appropriate manner. The paper critically examines all facets of urban civic amenities responsible for urban environmental degradation. It hints at the deficiencies in the abstraction from sources of water, such as Dams, its treatment, conduction and transmission with pipe materials. The computer modeling of networks of water supply for different urban centres and elimination of domestic underground tanks and boosting as a source of pollution can be done by computer modeling. The exorbitant magnitude of unaccounted water for different major cities have been identified and need for its reduction is impressed upon the house connections are to be improved. The sewerage system as a source of pollution without proper treatment has been mentioned. Poor urban drainage in the major urban centres which do not utilize the natural slope concept has been identified. Flow formula for sewer needs to be transformed from Manning to Cole Brooke White concept just as irrigation engineers converted it into the regime channel. Peak factors for automatic sewage pump stations are to be provided after conducting research and studies on them. Sewage treatment plant based on the appropriate and indigenous technology has been pointed out and treated effluent recycled. The solid waste management be properly organized and for year 2010 both solid and liquid waste are to be handled in such a manner that environment conducive for good public health standard is not disturbed. The master plan for urban drainage to be implemented in phases after the detailed designs and contract documents are produced. Without the suggested measures in the paper Pakistan would be entering the 21 st century in the grip of deficient environment.

While the planet on which we all have our abodes called "Earth", ever since its creation from primal matter Cosmo has undergone a tremendous environmental degradation, the life on this planet has encountered adverse environment visa-a-viz the original Creator's and creature's objectives. Holy Quraan in chapter "Rome" describes the situation in the following words "Fassad(Environmental conflicts) has appeared on land and sea because of what the human hands have wrought". While the developed western nations have restored the original conditions to a great extent through mitigational measures of the environmental "Fasaad" or what we call pollution with colossal cost and research, the developing countries in general and Pakistan in particular have to go a long way in meeting the requirements of the restoration of the natural environment in all its facets described in this paper which examines critically all such elements which are considered deficient from the contemporary state of art in the profession of Environmental Engineering culminating into a very poor public health standard what we have got in Pakistan.

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WATER SUPPLY

The successive governments in Pakistan have been promising to the teeming masses in both urban and rural areas the supply of adequate quantity and quality of potable water as a basic necessity of life to maintain the requisite public health standard in Pakistan. So far it has all been a "lip service" as almost one fourth of urban population and three fourth of the rural population still do not have access to the potable water as per W.H.O. guidelines and as per the targets set by the United Nations for 1980-90 decade.

Following anomalies are persisting in all the nook and corner of Pakistan with regards to the supply of water:-

Sources

For surface waters the Dams to impound water are not conventional water supply Dams provided with intakes for the abstraction of water from different level of the lakes in order to draw water from as near the surface of the lake as possible. Simly, Rawal and other dams are typical example which are constructed as irrigation dams with outlet at the bottom of the lake in order to draw all the water from the lake including the silt settled at the bottom for the purpose of agricultural and crop nutrition.

Ground water

Brackish water is rampaging the water logged areas and people are forced to drink the canal water. Reverse osmosis techniques need to be researched and adopted in such areas in order to have diesel driven portable reverse osmosis package plants toed with farm tractor from one cluster of villages to the other. The desalinated water for each cluster can be periodically replenished at strategic water points and the rural communities in such areas can get a great relief.

Surface water treatment

All the water works treating the surface raw water in the country are in shabby condition as far as clarification, filtration and disinfection is concerned to attain the W.H.O. guidelines standards. An indigenous concept of water treatment through clarifier, medium gravity filters produced by this author in 1977 for the then classified project namely the Kahuta laboratories is known to be effectively and excellently working so far. A replica of same where adopted functions well at Islamabad Haj complex, OGDC's Dakni well fields where the quality of treated water as analyzed is of the requisite quality. Further research and improvement is needed specially for the surface water with organic color and colloidal matter with low pH when excess of coagulants are used for flocculation. The hot climate effect on the canal water flow with regime hydraulic characteristics needs to be further appraised. Disinfection with chlorine or chloramines with proper contact time for the bactericidal action on pathogens in water needs to be properly applied and the chlorine residual monitored in the distribution network at the remote points. Regular sampling by the health authorities in all the water supply undertaking is of paramount importance as is the practice in vogue in other developing and developed

countries of the world in order to judge independently the quality of water being supplied to the consumers.

Pipe materials

The latest internationally developed and accepted pipe is the ductile cast iron pipe which has no doubt the high capital cost but is having double and treble useful life as compared with other materials. When amortized over the life span of different materials, it becomes the cheapest but certain lobbies have kept such pipes away from the extensive use. This pipe is being manufactured in Middle East countries and there is no reason that it can not be manufactured in Pakistan. Efforts need to be concerted towards this direction in order to have a proper leak-proof pipe material and joints for transmission and distribution system otherwise the magnitude of unaccounted water in the range of Islamabad 50-60%, Lahore, Karachi, Faisalabad in the range of 30-40% (in accordance with one study) renders the water supply system as most uneconomical and becomes a major cause of urban environmental degradation.

Bulk meters of venturi type with indication, integration and recording facilities are seldom installed for producing water balance of a distribution zone in large urban centers like Karachi, Lahore and Faisalabad after production of a computer model of the distribution networks with defined zones and sub zones and the water balance of the water fed into these.

Proper computer modeling can eliminate the need of domestic underground storage tanks and boosting to roof tanks which is an unnecessary source of energy consumption and pollution for every household. Also it nullifies the spirit of demand pattern in a network as the parameters such as average, max day, peak hour demand become meaningless.

House connections

The G.I. pipe house connection corrodes in a matter of 10-15 years causing reduced supply while the building life extends beyond 50 years. Polyethylene service connections are found to be hydraulically and life wise much more useful.

A.C. pipe fittings must be installed with Gibault detachable joints rather than using the push-on asbestos cement joints on cast iron fittings which slide under pressure causing thereby a perpetual leak which is unnoticeable and is a cause of high wastage in the distribution network.

POOR URBAN DRAINAGE

All major Pakistan cities except Islamabad are badly suffering from the monsoonal deluge which often occurs and the city drains are not capable of draining the runoffs from the paved urban areas with the result that city life is completely paralyzed during a rain storm apart from the loss of life and property. The adhoc urban developments with utter disregard to the south westerly sloping natural drainage is often responsible for this woeful situation. August 22, 1996 flooded the basements of several Plazas in Lahore causing thereby colossal loss of the merchandise.

The World Bank sponsored master plan produced for Lahore in 1988 was not implemented because of lack of contract documents and award of contract in time. Well coordinated with updated

urban hydrology for each urban center on the master plan basis is the dire need of the drainage for proper environment.

WASTEWATER TREATMENT

Industrial and domestic waste treatment plants, specially of indigenous and appropriate technology are to be researched and adopted for domestic water treatment plants as none is functioning in the country at the moment except a small one at Hyatabad Peshawar.

The recycling of the treated wastewater for irrigation purposes with the remnant nutritional values are to be applied. In urban areas acid rain are reported which would effect very badly all types of structures including the already over lived railway track and bridges. The so called green house effect and ozone depletion must be taken care of by reducing the air pollution with carbon monoxide discharged from the vehicular emission. Environmental carbon dioxide fixation with the afforestation at the hills and plains has become a necessity. In the year 2010 almost 23,000 tons per day and 11.6 million tons of liquid waste per day are to be handled in Pakistan for which preparation and initiatives are necessary. So far the management of these elements in the environment is known to be moving at snail's speed.

SEWERAGE SYSTEM

The sewerage system is mostly not functional because of the fact that monsoon generally follows an extended dry spell in which the solid in the domestic sewage get decomposed and dissolved to form a liquor which gets pressed hydraulically during the rainy season when the sewers are surcharged and each year an annular layer gets deposited in the form of a "coating" inside the sewer pipe which gets over the course of time hardened that ordinary jetting, flushing and scrapping seldom help and the sewers have to be abandoned. The system is partially combined and separate sewerage system needs to be introduced after thorough examination of the possibility of separating the flows at the household level.

The Manning formula in hot climate with sewage liquor need to be modified with Cole-Brook-White formula in line with the development by irrigation engineers Kennedy and Lacy who converted the Manning formula to suit the regime channel flow with a specific silt grade. The environmental engineers and other researchers must change Manning formula into Cole-Brook in accordance with the local conditions. The peak flow factor and automatic operation of the sewage pump station are to be synchronized to avoid any stagnancy of flow within the sewer.

Sewerage treatment methodologies

As said earlier no sewage treatment plant is functional in the country research should be conducted to pick up the most suitable method for different locations of the country depending upon the temperature, land cost and the skill to operate a sewage treatment plant.

Suburban sewers

The colony sewers should be carefully planned in the Area Development Schemes as large dia sewer when connected to a few houses without the self cleansing velocities would only silt up by the

time the other plots are connected. Domestic interceptors be introduced in all newly constructed houses so as to retain the settleable solid-sand and ashes within this interceptor for cleaning by the household rather than affecting the city sewers.

SOLID WASTE MANAGEMENT -

The per capita solid generation is of the order of 0.45 to 0.5 kg per capita per day which has undergone extensive quality changes and the local bodies responsible for their handling is seldom equipped with more than 70 % management. The remaining 30 % either blocks the city water ways or the city sewers. Proper handling and adequate disposal in accordance with the practice in vogue in other countries with similar socio-economic conditions is the dire need of Pakistan's environment and the sustainability of civic amenities and infrastructure in its proper form to save the environment from degradation.

Until and unless the foregoing items of environment technologies are brought up to date, Pakistan would enter 21 st century in the grip of deficient and unhealthy environment.

CONCLUSION.

Supply of proper potable water in quality and quantity is the dire need of the country in order to have proper and adequate Public Health standards.

Sources of surface and ground water should be properly protected against pollution and the raw water treated in accordance with the contemporary state of art in the profession of Water resources and Water supply engineering.

Research on the Economics and its application to reverse osmosis process for small rural communities in the water logged area should be conducted as this process is quite economical for the brackish water with 3,000 to 5,000 t.d.s.

Full treatment of water to W.H.O. guidelines with adequate clarification, filtration and disinfection should be universally applied to the surface water. For small treatment plants the indigenously developed designs for clarification and filtration upto 10 m.g.d. with one tenth of the cost of the imported Rapid Gravity Filters can be constructed where there is sufficient land available.

Pipe material of the best type is the need to reduce the unaccounted water. Ductile Cast iron pipes are known internationally to be the best material when amortized over their useful life as compared with other materials.

The sewerage systems should be designed after research into the Cole-Brook-White formula, which takes into considerations the temperature and variation in the climatic pattern as compared with the Manning formula in vogue at the moment in the country.

The sewage treatment methodology should be worked out in accordance with the local conditions using where possible the indigenous manufacturing facilities.

Urban sewers are usually choked because of the delayed programs of the Urban Development authorities for the development of plots when the self cleansing velocity is not generated in the branch sewers of the new housing colonies. Each house should have a domestic interceptor prior to the discharge of sewage from domestic premises to the public sewers.

Poor Urban drainage has demonstrated most of the many of the urban centres. Lahorites would never forget the deluge of August 22, 1996 that caused lot of property and life losses. World Bank sponsored Master plan produced for Lahore in 1988 was not implemented in time, when funds were available and only the contract documents were needed for the award of contracts to implement the first phase upto 1995.

For Waste Water treatment both domestic as well as industrial indigenous technologies have to be developed in order to save the environment from degradation as non of the installed treatment plants are functioning in the country except a small one at Hayatabad in Peshawar.

Because of the heavy air pollution, Acid rain has been observed to be falling in Lahore, which is likely to affect the metallic as well as other structures, specially, the already over-lived Railway tracks.

Solid waste generated at the rate of 0.45 to 0.5 kg/capita/day would be of the order of 43,000 tons a day, which have to be managed by the Municipal authorities who at the moment have only 70% working capacity. Entry into 21st century with the foregoing deficiencies would not auger well for the Pakistani environment and as such there is a great need to provide the remedial measures and financial resources of the country have to be mobilized accordingly.