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## WATER SUPPLY PROBLEMS IN RAWALPINDI CITY

By

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### Abstract

In 2008, more than half of the world's human population i.e. 3.3 billion people would be living in urban areas. By 2030, it is expected to balloon to almost 5 billion. Most of this growth will be in developing countries. The urban population of Africa and Asia is expected to double between 2000 and 2030 (UNFPA, 2007). Urban centers are increasing in size and number. At the beginning of the last century, there were only 11 megacities in the world with populations of more than 1 million each. By 2030, UN predicts that there will be more than 500 cities in the world with populations of more than 1 million each and it is expected that more than half of these cities will be in Asia. In addition, the peri-urban areas in many big cities are rapidly expanding.

The water distribution in very large cities is a serious problem of this millennium. Even the developed European cities are facing problems in maintaining and extending their networks. In the industrialized countries, technical problems grow and economic and viable solutions are pending. An adjustment of organization structures, gradually shifting from governmental to private, can already be noticed. As far as developing countries are concerned, solutions are almost completely missing (R. AZZAM, *et. Al*, 2006).

Accordingly, in the coming decades water distribution will be an ever-increasing matter of concern for the administrators of very large cities. Social and cultural as well as technical solutions are in demand, in order to keep these cities still livable in the future.

In Rawalpindi, high urban growth (4% per year), slow urban sector development, lack of resources and inadequate institutional capacity have resulted in uncontrolled urban sprawl, deteriorating urban environments and deficiencies in urban services (including water supply, sewerage systems, drainage, solid waste management, and community facilities). The resulting deficiencies particularly affected the urban poor and led to a considerably reduced quality of life, including poor health.

Mixed land use is predominant in the central areas of the city. The concentration of the commercial activity and its linear growth has created complex problems. Some efforts have been made to segregate non-compatible land uses but the same have proved ineffective due to absence of effective development control of details of various land uses of Rawalpindi.

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**PROBLEMS:****A. Integrated water supply distribution network:**

The early water supply system of Rawalpindi City was constructed during pre-independence period in 1926. A number of water supply projects were implemented in the past by different departments without integrating them with the existing network. The old water lines installed during past are still connected and unable to handle increased water supply in the network resulting in continuing increase in unaccounted water and the leakages.

In Rawalpindi water supply relies mainly on ground water source which is being exploited by more than 290 tubewells. The water distribution network in Rawalpindi is conglomerate of uni-tubewell or multi tubewells network mostly worked as independent water source. The surface water is also transported through same network or has its own commanded area. There is no drawing or data available for hydraulic analysis to find out exact distribution network resultantly some areas are facing acute water shortages while the others have excess supply. People are using suction pumps to overcome the demand which is the main source of contamination.

The main defects that are persistent since decades in Rawalpindi water supply distribution networks are as follows:

- Un-hygienic conditions at tubewells / reservoirs and other water distribution installations
- Leaky joints and pipes
- Cross flow between old and new pipe lines
- Pipe network is passing through sewerage drains
- Valve location at road crossing and same is used as garbage dumps
- Backflow from house connections
- Backflow from non-terminated new installation
- Faulty jointing mechanism and wrong jointing material

**Water Quality**

During last decades many efforts have been made to improve the water quality in Rawalpindi including replacement of old pipe lines and water purification plants. The water quality is improved or not is still a question. People on streets still complaining about water quality and hospital showing records of increased gastrointestinal diseases. Environment and water quality has deteriorated due to natural and anthropogenic reasons.

The main reason of contamination of tubewells is recharge mechanism of Nullah Lai and Korang River which carries the waste water of twin cities of Islamabad and Rawalpindi. The Rawal Lake, surface water source has also been contaminated due to massive urban development in the catchments and recharge area. Ground water aquifer has been bounded by these contaminated water sources which is ultimately polluting rather has already polluted the entire ground water aquifer. The old water distribution network is in very poor condition. The existing water supply to the residents of the City is inadequate and unsafe due to under sized and leaking pipes. Most of the distribution

lines are passing through sewerage drains which are causing contamination at consumer's end. The other factors responsible for contamination are as under:

- Non-existence of legislation on ground water extraction
- Imbalance / ill-planned / Un-documented Distribution Network
- Un-regulated / Non-metered / Non-judicious water supply
- Major Leakages in Feeding mains (Old PRCC Pipe lines)
- Hand-in-gloves laying of drinking water and sewerage lines-contaminant intrusion route,
- Installation of unauthorized suction pumps by consumers – major cause of contamination.
- Un-authorized Installation of water connections and un-approved ferrule size, in Commercial Plazas.
- Bacterial contamination in Ground water
- Contamination in Filtration Plants installed by TMA (Tehsil Municipal Authority).
- Poorly maintained Chlorination / Disinfection System.

To ensure drinking water quality in the service area of WASA, chlorination is done to eliminate the chances of contamination. Water quality is regularly monitored by WASA in its own laboratory for chemical and bacteriological examination of water. Any contamination noticed is rectified by flushing, chlorination and maintaining positive pressure in the distribution system or by the replacement of defective pipes.

### **Behavioral Problems**

Lack of awareness, illiteracy and unfavorable socio-economic conditions make the end users, most vulnerable to the adverse effects of any type of contaminated water and poor sanitation conditions. The current water management is basically pursued using a top-down management approach, in which the government and the private sectors are in charge of holding the control over water management. The citizens are hardly involved in and/or informed about the design and planning of the water management (S. Soviana et, al. 2009). No transparent information on pricing policy, on quality and safety issues of the delivered clean water is responsible for unawareness of actual position about WASA water supply. Therefore, it is not surprising that most of the individual households get water from mini Filtration plant or ground water drilling system although the clean water is delivered by WASA.

It is very important to design a new behavioral educational conception for the consumers because the only one approach usually used by the government (and its enterprises) i.e. through external pressure (e.g. through policies and regulations) will be no longer effective in future. Another option that relates to the amplifying people's internal motive and motivation should be considered. Instead of pushing people to do something (compulsory), a stimulation can be given to make them want to do something (voluntary). Further, a positive external motive (opportunities, incentives) and people's internal motivation should be combined in a way so that expected action can be achieved (Heckhausen, et, Al. 2008). This concept can be applied not only for the communities as users of clean water, but in general it is also relevant for the governmental officers and private sectors employees. Capabilities to promptly tackle

problems and to provide appropriate solutions need to be improved. Less bureaucracy, efficient organization platform, a high commitment to act according to the standard procedures and consumer-oriented management must be established to pursue a long-term sustainability. Incentives to conserve water and to protect environmental resources should be developed.

**Tariff and revenue problems for WASA**

There are approximately 85,000 domestic and commercial consumers with various categories for revenue generation purposes. The present revenue recovery rate is 65%. The unpaid arrears are increasing with higher rates. The entire efficiency of water business entity relies on its revenue generation in real time and space dimensions. People are not willing to pay even a single penny for utilizing water for the household and drinking purposes. Effective revenue recovery mechanism makes financial management of water business more versatile and flexible which in return improves better service delivery to its consumers.

**MANAGEMENT STRATEGIES**

Environmental problems today are complex, requiring a wide spectrum of solutions. Interdisciplinary approaches allow assessment at different concurrent levels, allowing integration of site-specific aspects. Water use Master Plans have to be developed which take technical, financial and political constraints into account. Technical and scientific specialists, who understand aquifer systems, water balances and water quantities from precipitation, storage, recharge and consumption, are required to include economic and social aspects in their considerations. Awareness from users and participation from stakeholders and decision makers are just as important as any form of water treatment or reuse. Nevertheless, the legal framework has to define water conservation and protection methods including:

- Pumping permits ;
- Definition of allowed uses ;
- Delineation of protection areas ;
- Identification of polluters and
- Monitoring.

The precondition of all measurements is an understanding of the flow system and the baseline of water quality before identifying emerging problems such as over abstraction or water pollution. Any implementation of management strategies is sensitive to the status of the country and the characteristics of the city source of water supply (Vázquez-Suné et al. 2005).

These management strategies only make sense, if there is public or municipal distribution of fresh water. In most megacities, with the expansion of informal settlements due to population growth, there is no connection to the municipal water supply and the sewerage network. In such circumstances, any management Master Plan would fail, because the people have no choice even to decide if they want to participate and behave in an environmental friendly way. They have to satisfy their elementary needs no matter if there is any contamination due to on-site sanitation or lowering the water table

due to tapping the municipal pipelines. In these circumstances, a short term solution is proposed and presented in the following section. A long-term concept should be provided to solve the problems that are described in Figure-1 concerning the water supply in fast growing cities. The first step of any strategy is to make potable water available for slum dwellers and establish sanitation facilities in the peri-urban areas using water houses.

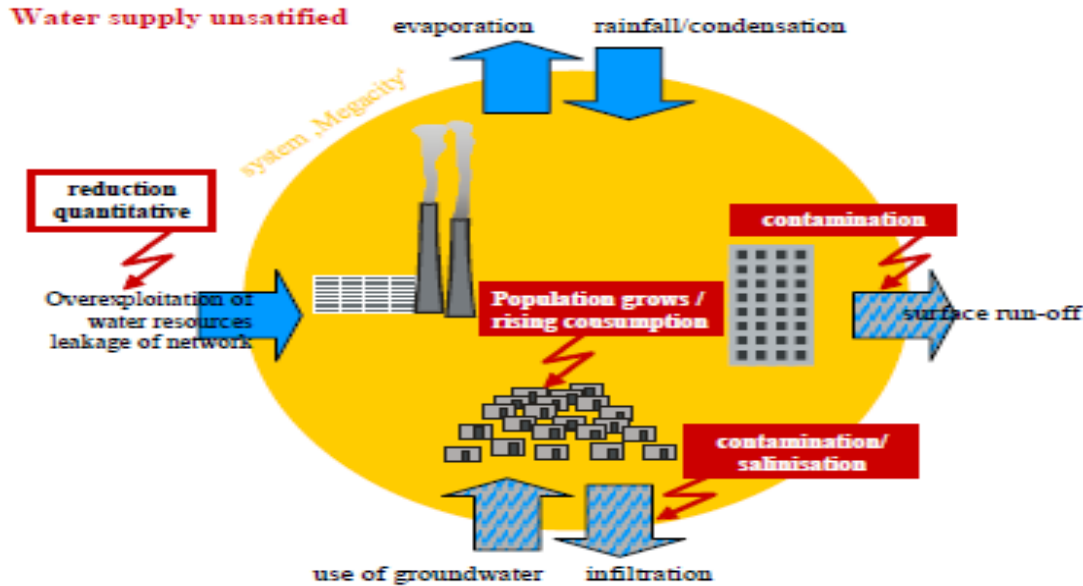


Figure-1: Unsatisfied water supply

**SUSTAINABILITY**

In order to provide basic water supply in a good quality and in a sufficient quantity for the large segment of the population in the fast growing megacities of the third world, small scale, integrated, decentralized supply and disposal systems have to be established next to the already described water management concepts (R. AZZAM, *et. Al*, 2006).



Figure-2: Positive effects

Basic needs have to be satisfied, which means making potable water, water for personal hygiene and water for washing available. To enable sustainable development in the peri-urban areas of fast growing cities, the water resources have to be used carefully and any possible method of water conservation to be taken into account, using suitable methods of reuse and treatment to supply quality sensitive uses.

### Conclusions

The whole city is violating the rules and ethics of the drinking water supply network. There is need to restrict the land use regulations specially for water supply sector which will ultimately help to improve the water sustainability and quality. A lot of work and struggle is required to make a behavior change of the community regarding uses, conservation and disposal of water. A mega funding should be provided by the Government to make a major change in the infrastructure of water supply system to get rid of the contamination problems. Modern and state of the art techniques are required to improve the management systems.

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