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MANAGEMENT OF URBAN WATER UTILITIES IN HUBLI - DHARWAD CITY: ISSUES & CHALLENGES

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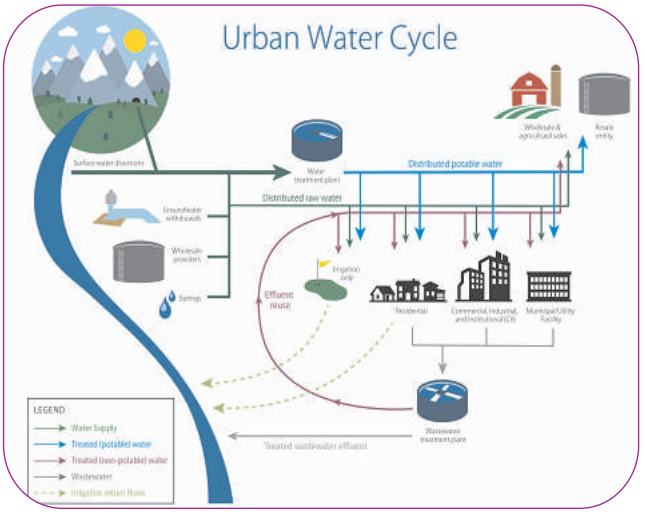
ABSTRACT: -

Prior to India's independence, the state took upon itself the role of sole provider of water. It was the colonial state that centralized control over water resources. The post-independent state inherited this role, and continued with it. This led to communities and households being no longer the primary agents of water provision and management. The HMWSSB treats water primarily as a social good. It follows a centralized, supply-drive approach of service delivery where water tariffs are highly subsidized for both the domestic users as well as the industrial users. Many have supported this approach by justifying that water is a fundamental right of the people. Article 21 of the Constitution guarantees the right to life, which also includes the right to clean drinking water. The State is duty-bound to provide it. However, inadequate resources constrained governments' ability to fulfill this goal and coverage and quality of services suffered. The Hubli-Dharwad cities together are the 44th largest conurbation in India. It is an important commercial, administrative cum industrial centre of the state. The congestion of urban settlement has given rise to many problems like housing, water, sanitation etc. The condition of drinking water supply is becoming deplorable news paper carry daily reports on the water shortage. The study is made an attempt issues and challenges of management of water supply in Hubli Dharwad city.

KEYWORDS: *Constitution guarantees, conurbation,*

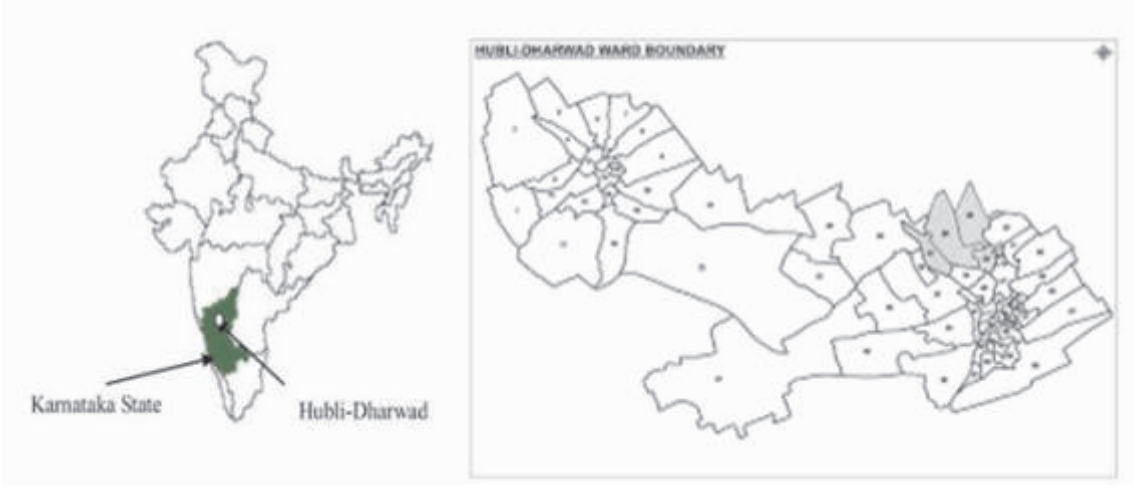
INTRODUCTION:

Our earth seems to be unique among the other known celestial bodies. It has water, which covers ¾ of its surface and constitutes 60-70 percent weight of the living the world. About 97% of water available on earth is sal ty seawater and 2% percent is frozen in glaciers and polar ice cups. Thus, the remaining 1 percent of world's water supply is a precious commodity necessary for our survival. Dehydration (lack of water) will kill us faster than starvation (lack of food) chronic dehydration is the root cause of many painful degenerative diseases, asthama, allergies, hypertension, excess body weight, and some emotional problems including depression. The scenario gets worse when water that looks drinkable can contain harmful elements, which could cause illness and death if ingested contaminants are more likely to cause health effects their occur long after repeated exposure to small amounts of a chemical example of chronic health effects includes cancer, liver kidney damage, disorder of the nerves system, damage



to the immune system and birth defects. Thus supply of sate and ad equate water is essential for health living. In Hubli-Dharwad this very objective is taken over by the Hubli-Dharwad water supply board. The condition of drinking water supply is becoming deplorable newspapers carry daily reports on the water shortage, poor quality of water supplied, inadequate services, notification from the water supply board for not being able to supply water to the localities and complaints from the inhabaints. Violent incidents pertaining to sharing of water are becoming a common features in the city. Especially in the summer months.

Study Region : The location of Hubli-Dharwad city extends from 15° 20' to 15° 28' latitude along the National Highway No. 4 and 75o 00' to 75o 9' E longitude. The extension of city is in a typical linear pattern of growth, extending along the National Highway with two focal points of intense development, one at Hubli and other at Dharwad, So the total area of the corporation at present is about 179.20 sq. km. (70 sq. miles) as against 41.86 sq. km. (16.35 sq. miles) of the earlier combined area.



BACKGROUND

Together Hubli-Dharwad is the 44th largest contribution in India. It lies 80 km east of the Goa and sits on the north Karnataka plain between 600 m and 700 m. on the watershed between rivers flowing east and west. The area is characterized by a monsoonal climate rainfall occurring from April and October. The measured average annual rainfall ranges from 400 – 1100 mm (average 768 mm) and the annual potentational evaporation rate based on pan measurements for the same period is 868 mm. Hubli trends to be drior on average than Dharwad. The underlying geology is complex and subject to a number of different interpretations. Generally Hubli-Dharwad lie on scnistone formations of Dharwad super group of Archaean age. Ground water occurs in weathered zones and under semi-confined conditions in deep jointed formations. Groundwater is contained in an upper probably unconfirmed and a lower confirmed or a partially confired aquiers. These are described in a regional context.

Hubli-Dharwad is the 44th largest city in India with a population of nearly 943788. It is an important commercial, administrative cum industrial centre of the state. With the growth of industrialization and urbanization the pressure on land and other resources has reached to intolerable proporitions. The congestion of urban settlement has given rise to many problems like housing, water, sanitation etc. It has been widely observed that water supply of Hubli-Dharwar is unreliable due to intermittent water supply per capita consumption per day has almost doubled in the last 10 years per unit cost of supplying water has increased by two and half times due to huge investments in gugmentation of water supply. Yet, the consumers cry foul of dissatification. While well-off consumption consumers cope up with situations by resorting to private ground water sources, the worker sections have no choice but to survive with whatever is available under the current delivary services. Further, as the ground water levels recedes the cost of pump also increases. Here again- its affluent who can afford to drill after while thus is a constraine option for those who barely manage to acquire a private source. Finally, such unregulated private drilling its unsustainable and has aggraviated the ecological

crisis of over exploitation of ground water.

METHODOLOGY

The study involved different stakeholders. Literature overview and browsing through some. Internet sites was the basic ground works for the study. The relevant data was collected from various sources. It involved interactions with a wide range of people and institutions ranging from consumers to researchers and government officials as get the required information's. The secondary sources comprised data and reports of various government departments' literatures from various environmentalists, academicians and institutions, news reports and various articles on the water crisis.

RELEVANCE OF STUDY

Urbanization is today the civilization of 20th century. It has been a worldwide phenomenon. Rapid urbanization has created many social economic and political problems and also lead to the formulation of slums. The urbanization giving to rise to the problems of water supply. Hubli-Dharwad cities are biggest in North Karnataka these are important trading, education, commercial industrial and administrative canters.

Factors of the Urbanization Process in Hubli-Dharwad City

Hubli-Dharwar city has experienced rapid urbanization through the last one and half centuries on account of many favorable geographical and other socio-economic factors. The factors responsible for this phenomenal growth of city have been summarized below:

1.The cool, healthy and pleasant climatic conditions have encouraged people to settle in Hubli-Dharwad cities.

2.The National Highway No.4 passes through the twin cities of Hubli-Dharwad. It has magnified the spatial interaction of Hubli-Dharwad city, with other important cities. Such an interaction through the National Highway has brought about changes and growth of Hubli-Dharwad city.

3 The early establishment of district headquarters and administrative offices and Nationalized Banks, specialized hospital facilities, court etc. are other factors responsible for urbanization and development of Hubli-Dharwad city.

4.The most important factors such as establishment of universities and other higher educational institutions and a large number of primary and high schools along with colleges have ultimately led to intensification of urbanization process in Hubli-Dharwad city.

5.It's well-recognized fact that industrialization and urbanization are closely linked. This fact is observable in case (study) of Hubli-Dharwad cities. There are a number of large scale, medium scale and also small-scale industrial units functioning in the twin cities of Hubli-Dharwad.

6.The migration study in Hubli-Dharwad indicates that the total population of Hubli-Dharwad consist approximately 33 percent of migrated people from its hinterlands. The industrial and education facilities, trade and commerce and the socio-economic facilities available in the twin cities have attracted a large number of people to settle. This is also an important aspect of urbanization process in the study area.

RESEARCH PROBLEM

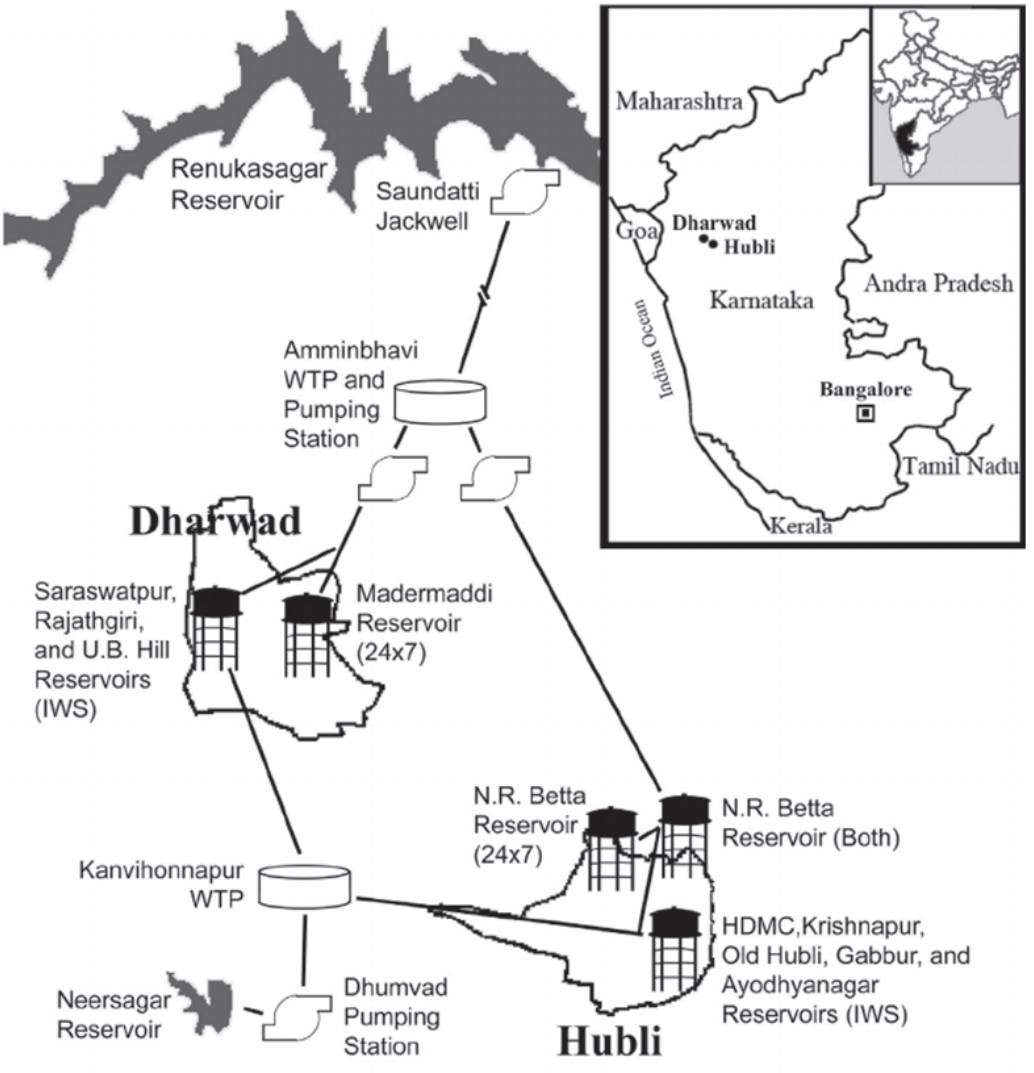
As per the norms stipulated in the code of basic requirements of water supply, drainage and sanitation as well as national building code (ISI 172), a minimum of 135 liters per capita per day (1 cpd) has to be provided to all residents with full flushing system of toilets. The population of Hubli-Dharwad during 2011 would be 90 lakhs based on 2011 census. On the average each person must receive 135 liters per day of water for a healthy living. This means the total requirements is 90,00,000 x 135 liters = 1215,000,000 liters (378 million liters).

While the potential supply is only 212 mgd, in reality the actual supply 150 mgd. As there is a physical loss of (33 percent) water transmission and distribution.

The analysis of the existing water supply position reveals that per capita supply for the population is for below the national standards.

The analysis of the existing water supply for the population is for below the national standards. However

in municipalities the existing supply position is far below the national standards. The position will further deteriorate as the population goes on increasing and industries come in the urban fringes.



WHY WATER IS SCARCE?

1. The use of rainwater and floodwater declined. In its place, there came a growing reliance on surface water (primarily rivers) and groundwater. Today, the effect of this way of managing water has lead to complete dependence on the state for any kind of water provision.
2. Over-extraction from rivers has degraded and polluted the surface waters.
3. Groundwater resources have been heavily over-used. The rate of recharge of water is considerably very low to that of disposal of wastewater.

Thus water availability, both in terms of quality and quantity, has declined to such an extent that today the state faces a drought-like situation. Cities require vast quantities of resources to run-both for urban inhabitants and for the economic activities that are clustered there. Human needs and desire for higher standards of living has aggravated this problem even more. Rich cities like Hubli-Dharwad draw on resources far from their boundaries. The growing demand for water, along with poor water resource management and mounting pollution levels, contributes to water supply problems in and around cities.

The challenge before the city authorities is immense. Like in most Indian cities, the water supply services in Hubli-Dharwad are prone to some systemic inefficiency. Water leakages are high (estimated at 40% under intermittent supply); not all households are connected to the city supply system; meters, where installed, are often faulty or tampered with; and systems to monitor water quality, quantity and pressure are weak. As a result, it has been estimated that the municipality recovers around 55% of its operating costs and, like many other urban local bodies in the country, does not have the financial resources to undertake routine maintenance, let alone making any fresh investments in infrastructure .The KUWSMP Project will be implemented by the Hubli-Dharwad Municipal Corporation, working in collaboration with the state-owned Karnataka Urban Infrastructure Development & Finance Corporation (KUIDFC). The municipality is hiring a professional water supply operating company (the operator) to help improve its water supply system.

INCREASING POPULATION:

The geographical spread of Hubli-Dharwar urban area had considerably changed over the decade in keeping with its population Last two decades have experienced a radical change in the relative growth pattern of the city. The population in municipalities has increased nearly 4 times than the population growth of Hubli-Dharwar. One of the reasons of rapid growth is migration from rural and smaller towns.

Table -1

The population of Hubli-Dharwad City (HDME) Decadal Growth Rate, the Population of the Cities and also Urban Population and its Growth in Karnataka and India for Comparison Purpose 1881-2021

Year	Total Population	% Growth	Population	Decadal Growth Rate	Population	Decadal Growth Rate
1881	63161	-	-	-	-	-
1891	83454	24.31	1639900	-	25616051	-
1901	81143	(-) 2.76	1563772	4.4	25580199	0.14
1911	91031	12.18	1840687	17.53	27971306	8.28
1921	100992	10.94	2239134	21.66	32976018	19.12
1931	124398	18.81	2753967	23.03	43558605	31.95
1941	143504	13.31	4453480	18.26	61629640	41.92
1951	196180	26.85	5266493	35.23	77562000	26.40
1961	248489	21.05	7122093	26.03	106966534	37.91
1971	379166	34.46	10729606	29.62	159727357	46.05
1981	527108	28.06	13907788	28.85	217611012	25.71
1991	648298	18.69	17919858	28.84	-	27.78
2001	786018	17.52	-	-	-	-
2011	927692	15.27	-	-	-	-
2021	1201131	22.76	-	-	-	-

Human vulnerability to the state of the environment depends directly upon the ability of the environment to supply the essential basic needs for humans, as well as on the economic and social capability of the individual to cope with environmental degradation. Water demands are growing with population and increasing income levels of the people.

MAINS WATER LEAKAGE

Initially Hubli and Dharwad had only two tanks as sources of water supply, Unkal Tank for Hubli and Kelageri Tank for Dharwad. As both cities grew the existing water supplies became inadequate and newer sources had to be developed.

The Neersagar reservoir was built in 1956 and still supplies drinking water to a part of Hubli city. The Malaprabha reservoir, initially built for irrigation, meets the drinking water needs of both Dharwad and the rest of Hubli. In 2001 an estimated 31.7 million m3 /yr was supplied to the HDMC water supply network.

From 1993 to 2001 about 3.7 million m3 /yr was lost from the Malaprabha source, due to leakage and power failure, before reaching Hubli-Dharwad. The water main to the cities was constructed of concrete which was easily damaged and readily broken by villagers along the pipeline trying to gain access to free water. Work started in 2001 and was completed in 2002, to replace the concrete pipe with a more robust bitumen lined steel pipe. From 2002 the total water supplied reached 35.4 million m3 /yr. table gives details of current water supplies to the Hubli-Dharwad.

Table 1
Volumes of water supplied to the HDMC area (millions m^3 /yr)

Reservoir	Water supplied		Leakage		
	Contribution	Total	Mains	Sewage	Total
1956 Neersagar (unenhanced)	6.6	6.6	2.6	1.2	3.8
1967 Neersagar (enhanced)	13.1	13.1	5.2	2.4	7.6
1983 Malaprabha Stage 1	12.4	25.5	10.2	4.6	14.8
1993 Malaprabha Stage 2	6.2	31.7	12.7	5.7	18.4
2002 Malaprabha repaired pipeline	3.7	35.4	14.2	6.4	20.5
2010 Malaprabha Stage 3	22.3	57.7	23.1	10.4	33.5

The population of the HDMC area has grown from 525,000 in 1981 to 736,000 in 2001 and water use per head is also increasing, as modern plumbing fittings and water using machines are installed. The current annual population growth rate of 2.35% means that the population of the twin cities will reach 1 million by 2010 and at that time the demand for water in the twin cities is expected to reach 54 million m^3 /yr at 150 l/head/day which cannot be met by current water supplies.

Current resources are not considered adequate and a third stage of the Malaprabha reservoir has now been approved and is designed to supply a further 22.3 million m^3 /yr by 2010.

Within the city the water distribution network has been expanded and extended well beyond its original design. A recent survey by Anglian Water UK estimated that 40% of water supplied to the distribution network was lost through leakage and illegal connections. Table gives estimated of mains water leakage which in 2002 was estimated to be 14.2 million m3 /yr.

SEWERAGE LEAKAGE

Leakage from the sewers can be assumed to be far worse than that from mains water supplies as sewer mains have more cause to be neglected, however Polisgowdar believes very little of this sewage leakage ends up in the rivers, 80-90% seeping into the water table the total amount of sewage generated is assumed to be equal to the amount of water actually supplied to households, and that 30% goes to cesspits, the remaining 70% flows through the sewers to the rivers.

Leaking sewers can also drain the water table, by allowing groundwater to seep in the sewer pipes when flows in the sewers are low. For the purposes of this paper it is assumed that only leakage from cesspits recharges the groundwater, while leakage from sewer pipes is assumed to drain away in the rivers. As leakage from the sewers is ignored, the estimates of groundwater recharge will be conservative. In 2002 this sewerage leakage is estimated as 6.4 million m^3 /yr

WATER QUALITY ASSESSMENT

If leakage was occurring in the volumes suggested above the ground waters within the HDMC area should be significantly more dilute than the surrounding rural area where the only recharge is from rainfall.

Water quality in eight peri urban villages was surveyed in May 2015 at the start of the monsoon. The water quality survey looked at four near villages (2-7 km) and three Far villages (8-15 km) from the urban area

located on N, S, E and W transects. Water samples were not collected from the Far village on the eastern transect because there were no hand pumps in use there, as the water was known to be non potable because of high conductivity.

Seventeen village hand pumps from the remaining villages were surveyed and the water samples then analysed. A large number of parameters were tested.

A statistical analysis of the water data was carried out, comparing Near and Far villages to see if ground waters near the HDMC area were more dilute.

The water quality survey results were compared against the Indian water quality standards. It was found that the majority of hand pumps, 14 out of 17 (82%) were non potable according to the Max Permissable Limit in Absence of Another Source (MPLAAS) (70%, without bacterial contamination being considered). The major parameters contributing to non portability were hardness (50%), bacterial contamination (23.5%) pH, turbidity, TDS and calcium.

When compared to the Highest Desirable Limits (HDL) for water, none of the water samples passed. All samples failed on hardness and calcium, 88% failed on conductivity and 50% on chloride.

When the water quality results were considered on a Near Far basis, 33% of Near villages were within the MPLAAS limits while 0% of Far villages had potable hand pump water supplies.

RECOMMENDATIONS:

Reducing unaccounted-for water: A low rate of unaccounted-for water is one of the best overall indicators that a water supply utility is successful. Unaccounted for water has two aspects:

1. Physical losses: Water actually lost through leaks. Leaks may occur in any part of the system: transmission pipes, service reservoirs, pumps, distribution networks, and house connections. Reducing leaks will increase the volume of water available for sale.
2. Administrative losses: Revenue lost through unbilled or under billed consumption. This can result from administrative failures such as inaccurate or faulty metering, incorrect billing, and theft. Correcting administrative losses will not increase the volume for sale. But legalizing or eliminating illegal connections, replacing faulty (under-registering) or broken meters, and ensuring that consumption is accurately billed will, however, increase revenues.

REASONS FOR UNACCOUNTED-FOR WATER PROBLEMS INCLUDE:

• Poor engineering, construction, and maintenance
• Poorly managed metering, billing, or collection
• Poor consumer relations • Illegal connections and theft, endemic in some cities.

SOLUTIONS TO REDUCE UNACCOUNTED-FOR WATER:

• Water Audit: Water audit, seeks to measure unaccountable for water and how much is lost at each phase of processing-production, transmission, service reservoirs, house connections, metering, and billing. To determine and investigate the volume of unaccountable for water the flow of water needs to be measured accurately at the various stages of the operation. This also helps in effective preventive maintenance.
• Preventive maintenance of the pipelines, reservoirs must be done to avoid leakages in the distribution system. Usage of anticorrosive pipelines will be effective.
• In systems where consumption is not metered (that is, where consumers are charged a flat rate), unaccountable for water cannot be measured accurately so it must be made mandatory that every consumer installs meters.
• In metered systems, meters those has been tampered, or are faulty or broken, are a major cause of administrative losses. Meters may break due to excessive network pressure, freezing temperatures, or malicious damage. They may under-register consumption if water pressure is unusually low, or over-register it because air has infiltrated the system. Hence, periodic maintenance and inspection of meters must be done.
• Though illegal tapping of water is banned many of them resort to illegal connections. Strict punishment and

fine must be imposed on such people. The motors and pumps used by people to suck water from the main pipelines must be seized.

• The board must integrate with other public departments like the APSEB" so that they could disconnect the power in area during the water supply schedule. This will help in controlling illegal sucking of water from the main pipes and equality of water supply.

MAINTENANCE:

Distribution system is an asset of the Board. Maintenance of the assets helps in longer efficient usage of the assets. Maintenance can be classified as:

• Preventive or routine maintenance,

• Reactive maintenance.

Preventive maintenance is carried out continuously according to pre-established schedules. It includes systematic inspection and replacement of consumption meters, leak detection, inspection of motors, pumps etc.

Reactive Maintenance is carried out during contingences. It is needed where past routine maintenance has been insufficient, as well as after accidents. All interventions need to be analyzed and the causes of malfunction or breakage recorded, so as to guide future procurement decisions and help in deciding to upgrade or replace the system. However, such maintenance decision must be immediate without any delay in the procedure to avoid adverse effects.

MONITORING PERFORMANCE:

Monitoring shows whether an activity is improving, stagnating, or deteriorating. It is a more reliable basis for prediction. Water extraction, treatment, quality and conveyance, effluent collection and disposal, plant maintenance, and commercial and financial operations all need to be monitored, some on a quarterly or monthly basis, some on a weekly or even daily basis.

• Since the board is dependable on the contract labour that are very indifferent to the organization monitoring of their work is essential. There is a need for continuous supervision of work on the field and the material used in the work. A small distortion from the standards would hinder the performance of the system.

• Managers must have access to the information (revenue, material, performance, complaints) on a timely basis, and be prepared to act expeditiously on critical issues. There must be a proper networking between each department.

• The quality of the water extracted, particularly that drawn from rivers, must be routinely tested in order to adjust treatment as required, and provide feedback to environmental agencies.

RAINWATER HARVESTING:

Rainwater harvesting is the collection of raindrops. Encourage rainwater harvesting. The collected water can be used for washing clothes, bathing, gardening, and after treatment also for drinking and food preparation. Rainwater harvesting can supplement/replace existing water supplies.

ADVANTAGES:

• Rainwater harvesting systems is a personal water supply system.

• It is integrated with the house, which makes the water easily accessible.

• Rainwater harvesting systems are personal which prevents arguments about who should take care of maintenance.

• Installation costs are low.

• The construction is easy and cheap in maintenance.

• If this water is pumped into the ground it recharges the ground water table.

URBAN PLANNING:

The concept of sustainable development must be strictly implemented. Development in an area must be such that it meets the needs of present without compromising the ability of the future generations to meet their own needs. Sustainable development would ensure minimum adverse impacts on the quality of air, water and terrestrial environment. Urban planning should be based on an integrated approach to provide and maintain basic services. The government must preplan the layout of the land-size of the water supply and drainage system, the width of the road, type of construction in the location etc anticipating the future needs. The government must restrict the construction of apartments on residents' independent plots. The growth in the city must be planned in a sustainable way else this city would turn out to be a big slum.

PRICING:

Water tariff must be designed to recover costs incurred by the service provider but water charging has to be equitable, affordable, transparent and fair in the burden of costs between different groups of consumers. Hence, there is a need to redefine the domestic tariff blocks. There is a need for further division of the block. In Hubli -Dharwad, the non-domestics tariff are highly subsidized than the other cities, there is need to reduce this generous help. Method of pricing of water connection charges must be revised. There is need to price it according to some rational factors like location, category of consumers, water requirement etc. One must also recognize that the board needs to make an economic return to finance and maintain the investment levels needed.

PRIVATE PUBLIC PARTICIPATION:

There is need for interaction and cooperation of the general public in the maintenance of the distribution system. Consumers, employees, financial institutions, and NGOs do have a stake in the board. Participation of these vital stakeholders helps in a critical evaluation of performance. Their valuable opinions and cooperation helps in formulating very efficient management policies.

ENSURING AFFORDABILITY FOR THE POOR.

To ensure that water remains affordable for the poor, the Hubli-Dharwad authorities have applied a pro-poor policy in the demo zones and will now be adopted for the entire city. This includes provisions to ensure that the water tariff for lifeline consumption (up to 8KL) is kept at levels that poorer households can afford. The Project will also ensure that poorer households are able to avail of the improved services by subsidizing household-level water connections.

The operator will be required to collect the tariff on behalf of the city and transfer it to a city account, but the decisions on how much to charge will be made by the elected city corporation after consultation with all stakeholders, and in keeping with the tariff guidelines laid down by the state government.

The Project will also help the Hubli- Dharwad Municipal Corporation set up a city-level water utility and build its capacity to take over and manage water supply operations once the contract with the operator comes to an end.

CONSERVATION:

Sound water use practices reduce the amount of stress that we place on our resources. Conservation can be done both by limiting water withdrawals and by decreasing wastewater discharges.

- Conserving water reduces wear and tear on major infrastructure such as water and wastewater treatment plants and the distribution systems that deliver water to consumers.
- Can postpone or eliminate the need for making major investments in new infrastructure.
- Using less water helps us to become more flexible during times when there is a water shortage.

CONCLUSION:

- The customary practice of meeting urban water deficit through supply augmentation by tapping new, distant,

and multiple-use water sources often disturbs inter-sectoral allocation and causes inter-sectoral water conflicts. It's the narrow sectoral interests that compelled investments in augmentation of water has neither led to efficient utilization of funds nor reduced the problem faced by the general public. It has only increased the cost and debts to the board.

• The pressure to provide services to more people intensifies as the mandate of the board increases. As a result, new facilities receive higher priority, in terms of budgets and staffing, than operation and maintenance.

• Planning on water management needs to reflect the integration of water with other natural and socio-economic systems. This requires cooperation between governments, the private sector and communities.

• The prime cause of poor operation and maintenance is poor management. Good operation and maintenance can enhance the quality of service, extend the valuable life of the infrastructure and improve the financial performance of water utilities. Minimizing the costs of operating costs, proficient management of expenditures, assets, and liabilities are just as important as preventing losses of water from the system.

• Water is a finite, vulnerable and essential resource, which should be managed in an integrated manner.

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